```
b 9,15,16,20,148,160,256 [redacted],278,621,623,624,634,636,810,8[redacted]625,268,626,267,139,608
>>>         278 does not exist
s error and risk and (bayes or bayesian) and probabiity and variable and conditional pr
obability
          571695  ERROR
         3723317  RISK
            3177  BAYES
            9147  BAYESIAN
               6  PROBABIITY
          498775  VARIABLE
               0  CONDITIONAL PROBABILITY
      S1       0  ERROR AND RISK AND (BAYES OR BAYESIAN) AND PROBABIITY AND
                  VARIABLE AND CONDITIONAL PROBABILITY
?s error and risk and (bayes or baysian) and conditional and probability and initial an
d network
          571695  ERROR
         3723317  RISK
            3177  BAYES
              55  BAYSIAN
          171518  CONDITIONAL
          179276  PROBABILITY
         2662720  INITIAL
         6958691  NETWORK
      S2      15  ERROR AND RISK AND (BAYES OR BAYSIAN) AND CONDITIONAL AND
                  PROBABILITY AND INITIAL AND NETWORK
```

Dhloe 6/27/04

R. Whitney Winston
Kilpatrick Stockton LLP
Re: DIVA Patent Application
Your Ref.: C0464.190521 (CITI0192)

Non-Patent Literature Search Results

?b eecomp

```
      29feb00 22:44:43 User154250 Session D5.1
         $0.00    0.159 DialUnits FileHomeBase
    $0.00  Estimated cost FileHomeBase
    $0.40  TYMNET
    $0.40  Estimated cost this search
    $0.40  Estimated total session cost   0.159 DialUnits

SYSTEM:OS  - DIALOG OneSearch
  File   2:INSPEC  1969-2000/Jan W4
         (c) 2000 Institution of Electrical Engineers
  File   6:NTIS  64-2000/Mar W3
         Comp&distr 1998 NTIS, Intl Copyright All Righ
  File   8:Ei Compendex(R)  1970-2000/Feb W1
         (c) 2000 Engineering Info. Inc.
  File  34:SciSearch(R) Cited Ref Sci  1990-2000/Feb W3
         (c) 2000 Inst for Sci Info
  File  64:Global Mobility Database (R)  1965-1999/Aug
         (c) 1999 SAE Inc.
*File  64: The file will be removed from Dialog on April 30, 2000.
  File  65:Inside Conferences  1993-2000/Apr W4
         (c) 2000 BLDSC all rts. reserv.
  File  92:IHS Intl.Stds.& Specs.  1999/Nov
         (c) 1999 Information Handling Services
*File 92: Weekly updates include only MILSPEC documents.
STANDARDS subfile is updated via bimonthly reloads.
  File  94:JICST-EPlus  1985-2000/Nov W1
         (c)2000 Japan Science and Tech Corp(JST)
  File  99:Wilson Appl. Sci & Tech Abs  1983-2000/Dec
         (c) 2000 The HW Wilson Co.
  File 103:ENERGY SCITEC  1974-2000/DEC B2
         (c) 2000 CONTAINS COPYRIGHTED MATERIAL
*File 103: For access restrictions, see HELP RESTRICT.
  File 108:Aerospace Database  1962-2000/Feb
         (c) 2000 AIAA
  File 144:Pascal  1973-2000/Feb
         (c) 2000 INIST/CNRS
  File 239:Mathsci(R)  1940-2000/Feb
         (c) 2000 American Mathematical Society
  File 241:Elec. Power DB  1972-1999Jan
         (c) 1999 Electric Power Research Inst.Inc
  File 434:SciSearch(R) Cited Ref Sci  1974-1989/Dec
         (c) 1998 Inst for Sci Info
  File 647:CMP  Computer Fulltext  1988-2000/Feb W3
         (c) 2000 CMP

     Set  Items  Description
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?s bayes? or probabil? or stochastic? or belief
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```
        68948  BAYES?
       774862  PROBABIL?
       434339  STOCHASTIC?
        30756  BELIEF
     S1 1125517  BAYES? OR PROBABIL? OR STOCHASTIC? OR BELIEF
?s s1 (5N) net?
      1125517  S1
      1912042  NET?
    S2  29316  S1 (5N) NET?
?s (expert or knowledge) (5N) (base or system?)
Processing
Processing
Processed  10 of  16 files ...
Processing
Processing
Completed processing all files
       176429  EXPERT
       560829  KNOWLEDGE
      1225526  BASE
     12735123  SYSTEM?
    S3  221751  (EXPERT OR KNOWLEDGE) (5N) (BASE OR SYSTEM?)
?s s1 or s3
      1125517  S1
       221751  S3
    S4 1334349  S1 OR S3
?s s4 and financ?
      1334349  S4
       259164  FINANC?
    S5   8880  S4 AND FINANC?
?s s5 and (risk or derivative?)
        8880  S5
       727460  RISK
       848081  DERIVATIVE?
    S6   1942  S5 AND (RISK OR DERIVATIVE?)
?t s6/6/1

 6/6/1     (Item 1 from file: 2)
6512318   INSPEC Abstract Number: C2000-04-1340G-003
 Title: Controlled Markov processes and mathematical finance
  Publication Date: 1999
  Copyright 2000, IEE
?rd
...examined 50 records  (50)
...examined 50 records  (100)
...examined 50 records  (150)
...examined 50 records  (200)
...examined 50 records  (250)
...examined 50 records  (300)
...examined 50 records  (350)
...examined 50 records  (400)
...examined 50 records  (450)
...examined 50 records  (500)
...examined 50 records  (550)
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...examined 50 records  (700)
...examined 50 records  (750)
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...examined 50 records (850)
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...examined 50 records (1100)
...examined 50 records (1150)
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...examined 50 records (1600)
...examined 50 records (1650)
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...examined 50 records (1750)
...examined 50 records (1800)
...examined 50 records (1850)
>>>Record 647:1015650 ignored; incomplete bibliographic data, not retained in RD set
>>>Record 647:650051 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:645143 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:641866 ignored; incomplete bibliographic data, not retained - in RD set
...examined 50 records (1900)
>>>Record 647:580767 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:578457 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:577632 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:553429 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:508360 ignored; incomplete bibliographic data, not retained - in RD set
>>>Record 647:508333 ignored; incomplete bibliographic data, not retained - in RD set
...completed examining records
S7 1563 RD (unique items)
?s (bayesian or belief) (3N) network?
48710 BAYESIAN
30756 BELIEF
1530657 NETWORK?
S8 5088 (BAYESIAN OR BELIEF) (3N) NETWORK?
?s s7 and s8
1563 S7
5088 S8
S9 6 S7 AND S8
?t s9/6/1-6

9/6/1 (Item 1 from file: 8)
04536692
Title: Constructing Bayesian networks to predict uncollectible

telecommunications accounts
Publication Year: 1996

9/6/2 (Item 1 from file: 34)
05907269 Genuine Article#: XF842 Number of References: 152
Title: Maximization and the act of choice (ABSTRACT AVAILABLE)
Publication date: 19970700

9/6/3 (Item 2 from file: 34)
04782490 Genuine Article#: UG531 Number of References: 43
Title: AN INFORMATION-THEORETIC TECHNIQUE TO DESIGN BELIEF NETWORK-BASED EXPERT-SYSTEMS (Abstract Available)

9/6/4 (Item 3 from file: 34)
02998107 Genuine Article#: MX917 Number of References: 46
Title: UNCERTAINTY ANALYSIS APPLIED TO SUPERVISED CONTROL OF APHIDS AND BROWN RUST IN WINTER-WHEAT .1. QUANTIFICATION OF UNCERTAINTY IN COST-BENEFIT CALCULATIONS (Abstract Available)

9/6/5 (Item 4 from file: 34)
02281168 Genuine Article#: KQ176 Number of References: 24
Title: ON KNOWLEDGE REPRESENTATION IN BELIEF NETWORKS (Abstract Available)

9/6/6 (Item 1 from file: 647)
01136279 CMP ACCESSION NUMBER: IWK19970825S0036
the Future is Now - Leading-edge IT managers tap into vendor R&D efforts
PUBLICATION DATE: 970825
WORD COUNT: 3208
?t s9/7/1,3,5

9/7/1 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04536692 E.I. No: EIP96100378405
Title: Constructing Bayesian networks to predict uncollectible telecommunications accounts
Author: Ezawa, Kazuo J.; Norton, Steven W.
Corporate Source: AT&T Consumer Lab, Murray Hill, NJ, USA
Source: IEEE Expert v 11 n 5 Oct 1996. p 45-51
Publication Year: 1996
CODEN: IEEXE7 ISSN: 0885-9000
Language: English
Document Type: JA; (Journal Article) Treatment: A; (Applications); T; (Theoretical)
Journal Announcement: 9612W4
Abstract: The complexities of building models that can predict whether a customer account or transaction is collectible are greater than most current learning systems can handle. This article describes software that builds Bayesian network models for such prediction. The Advanced Pattern Recognition and Identification (APRI) system's key strength is its ability to efficiently select relevant variables and dependencies to build conditionally dependent models. In fact, APRI reads the data from

secondary storage at most five times during the entire model-building process. This is in sharp contrast to other Bayesian network learning systems, whose complexity grows linearly or quadratically with the number of input variables. 10 Refs.

9/7/3 (Item 2 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

04782490 Genuine Article#: UG531 Number of References: 43
Title: AN INFORMATION-THEORETIC TECHNIQUE TO DESIGN BELIEF NETWORK-BASED EXPERT-SYSTEMS
Author(s): SARKAR S; SRIRAM RS; JOYKUTTY S; MURTHY I
Corporate Source: LOUISIANA STATE UNIV,COLL BUSINESS ADM,DEPT INFORMAT SYST & DECIS SCI/BATON ROUGE//LA/70803; GEORGIA STATE UNIV,SCH ACCOUNTANCY/ATLANTA//GA/30303
Journal: DECISION SUPPORT SYSTEMS, 1996, V17, N1 (APR 22), P13-30
ISSN: 0167-9236
Language: ENGLISH Document Type: ARTICLE
Abstract: This paper addresses the problem of constructing belief network based expert systems. We discuss a design tool that assists in the development of such expert systems by comparing alternative representations. The design tool uses information theoretic measures to compare alternative structures. Three important capabilities of the design tool are discussed: (i) evaluating alternative structures based on sample data; (ii) finding optimal networks with specified connectivity conditions; and (iii) eliminating weak dependencies from derived network structures. We have examined the performance of the design tool on many sets of simulated data, and show that the design tool can accurately recover the important dependencies across variables in a problem domain. We illustrate how this program can be used to design a belief network for evaluating the financial distress situation for banks.

9/7/5 (Item 4 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

02281168 Genuine Article#: KQ176 Number of References: 24
Title: ON KNOWLEDGE REPRESENTATION IN BELIEF NETWORKS
Author(s): ABRAMSON B
Corporate Source: UNIV SO CALIF,DEPT COMP SCI/LOS ANGELES//CA/90089
Journal: LECTURE NOTES IN COMPUTER SCIENCE, 1991, V521, P86-96
ISSN: 0302-9743
Language: ENGLISH Document Type: ARTICLE
Abstract: Three focal elements of knowledge-based system design are (i) acquiring information from an expert, (ii) representing the information in a system-usable form, and (iii) using the information to draw inferences about specific problem instances. In the artificial intelligence (AI) literature, the first element is referred to as knowledge acquisition, while the second and third are embodied in a system's knowledge base and inference engine, respectively. AI, however, is not alone in its concern for these issues. Researchers in several of the statistical decision sciences, notably decision analysis (DA), have also investigated them. This paper discusses the use of belief networks-a formalism that lies somewhere between AI and DA-as an

overall framework for knowledge-based systems. Unlike previous work, which has concentrated on either the networks' mathematical properties or on their implementation as a specific system, this paper is oriented towards the concerns of general system design. Concrete examples are drawn from one medical system (Pathfinder) and from one financial system (ARCO1), and in particular, from a consideration of their similarities and differences. The design principles abstracted from these systems suggests a powerful, coherent design philosophy guided by the simple thought: form follows function.

?s s8 and financ?
5088 S8
259164 FINANC?
S10 46 S8 AND FINANC?
?s s10 and (risk or derivative?)
46 S10
727460 RISK
848081 DERIVATIVE?
S11 6 S10 AND (RISK OR DERIVATIVE?)
?s7 and caus?
Processed 10 of 16 files ...
Completed processing all files
2483394 7
1793209 CAUS?
S12 157291 7 AND CAUS?
?s 7 and caus?
2483394 7
1793209 CAUS?
S13 157291 7 AND CAUS?
?s s7 and caus?
1563 S7
1793209 CAUS?
S14 97 S7 AND CAUS?
?s s11 not s9
6 S11
6 S9
S15 0 S11 NOT S9

?t s14/6/1-97

14/6/1 (Item 1 from file: 2)
6445719 INSPEC Abstract Number: C2000-02-1290D-038
Title: A new stochastically flexible event methodology with application to Proposition 103
Publication Date: 16 Nov. 1999

14/6/2 (Item 2 from file: 2)
6247982 INSPEC Abstract Number: C1999-06-1290D-090
Title: From ruin theory to pricing reset guarantees and perpetual put options
Publication Date: 31 March 1999

14/6/3 (Item 3 from file: 2)
5477709 INSPEC Abstract Number: B9702-8260-016

Title: Fatigue reliability of wind turbine fleets: the effect of uncertainty on projected costs
Publication Date: Nov. 1996

14/6/4 (Item 4 from file: 2)
5206589 INSPEC Abstract Number: C9604-7160-051
Title: An innovative decision support system for reliability assessment of management structures of organizations in the construction industry
Publication Date: 1995

14/6/5 (Item 5 from file: 2)
5193072 INSPEC Abstract Number: C9604-7165-002
Title: Forecasting short term regional gas demand using an expert system
Publication Date: 1996

14/6/6 (Item 6 from file: 2)
4995552 INSPEC Abstract Number: B9508-0160-009
Title: From determinism to probabilism
Publication Date: Sept.-Oct. 1995

14/6/7 (Item 7 from file: 2)
4973864 INSPEC Abstract Number: B9507-0170N-041
Title: Using R&M analysis to calculate economic risk in the process industries
Publication Date: 1995

14/6/8 (Item 8 from file: 2)
4931938 INSPEC Abstract Number: C9506-1290D-006
Title: Martingale analysis for assets with discontinuous returns
Publication Date: Feb. 1995

14/6/9 (Item 9 from file: 2)
4585647 INSPEC Abstract Number: C9403-6170-026
Title: Examples of causal probabilistic expert systems
Publication Date: 1993

14/6/10 (Item 10 from file: 2)
03361217 INSPEC Abstract Number: A89053325, B89035482
Title: Functional perspective on risk analysis in nuclear power
Publication Date: 1987

14/6/11 (Item 11 from file: 2)
03029378 INSPEC Abstract Number: B88000268
Title: A RAM evaluation tool: combining abridged-PRA with root-cause

analysis
Publication Date: 1987

14/6/12 (Item 1 from file: 6)
1950853 NTIS Accession Number: DE96004308
Fatigue reliability of wind turbine fleets: The effect of uncertainty of projected costs
1995

14/6/13 (Item 2 from file: 6)
1768953 NTIS Accession Number: AD-A270 711/5
Economic Analysis of Costs Incurred from Chemical Exposures in the Workplace Resulting in Non-Carcinogenic Responses as Additional Justification for Pollution Prevention Projects
(Master's thesis)
26 Aug 93

14/6/14 (Item 3 from file: 6)
1747463 NTIS Accession Number: DE93621309
Foersaekringspremier foer svenska kaernkraftverk. (Insurance cost of Swedish nuclear power plants)
1992

14/6/15 (Item 4 from file: 6)
1616733 NTIS Accession Number: DE92000132
When is a dose not a dose
1991

14/6/16 (Item 5 from file: 6)
1021563 NTIS Accession Number: NUREG/CR-1120-V10
Seismic Safety Margins Research Program
(Progress rept. no. 14)
Jan 83

14/6/17 (Item 6 from file: 6)
0644752 NTIS Accession Number: PB-268 926/3/XAB
Financing Minority Enterprise via the Economic Opportunity Loan Program: An Evaluation
(Discussion papers)
Aug 74

14/6/18 (Item 1 from file: 8)
03472890
Title: Problems in the economic evaluation of proposed projects in emerging energy technologies.
Conference Title: AIChE National Meeting
Publication Year: 1991

14/6/19 (Item 2 from file: 8)
02098532

Title: EXPERT SYSTEM FOR FOREIGN CURRENCY HEDGING.
Conference Title: 1985 ACM Thirteenth Annual Computer Science Conference.
Publication Year: 1985

14/6/20 (Item 3 from file: 8)
01354788
Title: Risk Analysis Oriented towards Financial and Technical Control.
Title: L'ANALYSE DE RISQUE VERS UNE MAITRISE FINANCIERE ET TECHNIQUE.
Publication Year: 1982

14/6/21 (Item 4 from file: 8)
01165036
Title: MANAGING RISKS PART OF SUCCESS.
Publication Year: 1982

14/6/22 (Item 1 from file: 34)
08413949 Genuine Article#: 282ZB Number of References: 35
Title: Nitrogen and phosphorous management on Wisconsin farms: Lessons learned for agricultural water quality programs (ABSTRACT AVAILABLE)
Publication date: 20000000

14/6/23 (Item 2 from file: 34)
08250374 Genuine Article#: 262XL Number of References: 41
Title: Which statin is most efficient for the treatment of hypercholesterolemia? A cost effectiveness analysis (ABSTRACT AVAILABLE)
Publication date: 19991100

14/6/24 (Item 3 from file: 34)
07559345 Genuine Article#: 181FE Number of References: 116
Title: Risk and dangerousness (ABSTRACT AVAILABLE)
Publication date: 19990300

14/6/25 (Item 4 from file: 34)
07098164 Genuine Article#: 124CW Number of References: 59
Title: The Seinhorst Research Program (ABSTRACT AVAILABLE)
Publication date: 19980900

14/6/26 (Item 5 from file: 34)
07005737 Genuine Article#: 114CD Number of References: 16
Title: Exceptional circumstances provisions in Australia - is there too much emphasis on drought? (ABSTRACT AVAILABLE)
Publication date: 19980700

14/6/27 (Item 6 from file: 34)
06154215 Genuine Article#: XY695 Number of References: 75
Title: Farm decision making under risk and uncertainty (ABSTRACT AVAILABLE)
Publication date: 19970700

14/6/28 (Item 7 from file: 34)
05866702 Genuine Article#: XD047 Number of References: 53
Title: Stressful life events and genetic liability to major depression: Genetic control of exposure to the environment (ABSTRACT AVAILABLE)
Publication date: 19970500

14/6/29 (Item 8 from file: 34)
05617042 Genuine Article#: WK912 Number of References: 12
Title: A prophylactic implantable cardioverter-defibrillator? (ABSTRACT AVAILABLE)
Publication date: 19960912

14/6/30 (Item 9 from file: 34)
05371123 Genuine Article#: VU201 Number of References: 44
Title: RISK PROPENSITY AND FIRM PERFORMANCE - A STUDY OF THE PETROLEUM-EXPLORATION INDUSTRY (Abstract Available)

14/6/31 (Item 10 from file: 34)
05112747 Genuine Article#: VB050 Number of References: 20
Title: PREDICTING THE PRESENT VALUE DISTRIBUTION OF A FOREST PLANTATION INVESTMENT (Abstract Available)

14/6/32 (Item 11 from file: 34)
05074634 Genuine Article#: TN531 Number of References: 37
Title: THE PRODUCTIVITY OF FINANCIAL INTERMEDIATION AND THE TECHNOLOGY OF FINANCIAL PRODUCT MANAGEMENT (Abstract Available)

14/6/33 (Item 12 from file: 34)
04145498 Genuine Article#: RH715 Number of References: 37
Title: THE STRUCTURAL RELATIONSHIP BETWEEN FINANCIAL RATIOS AND CAPITAL-ASSET PRICING (Abstract Available)

14/6/34 (Item 13 from file: 34)
03865509 Genuine Article#: QM820 Number of References: 12
Title: APPARENTLY STABLE INCREMENTS IN FINANCE DATA - COULD ARCH EFFECTS BE THE CAUSE (Abstract Available)

14/6/35 (Item 14 from file: 34)
03506818 Genuine Article#: PJ325 Number of References: 33
Title: BENEFIT TRANSFER PROTOCOL FOR LONG-TERM HEALTH RISK VALUATION - A CASE OF SURFACE-WATER CONTAMINATION (Abstract Available)

14/6/36 (Item 15 from file: 34)
02281168 Genuine Article#: KQ176 Number of References: 24
Title: ON KNOWLEDGE REPRESENTATION IN BELIEF NETWORKS (Abstract Available)

14/6/37 (Item 1 from file: 94)
04147781 JICST ACCESSION NUMBER: 99A0538729 FILE SEGMENT: JICST-E

Acceptance of Long-term Probabilistic Forecast of Earthquake and its Social Meanings., 1999

14/6/38 (Item 2 from file: 94)
04113525 JICST ACCESSION NUMBER: 99A0441625 FILE SEGMENT: JICST-E
Efficiency in the Japanese Life Insurance Market and Advertising., 1998

14/6/39 (Item 3 from file: 94)
02347686 JICST ACCESSION NUMBER: 95A0549029 FILE SEGMENT: JICST-E
The Development of Forestry Manegment and the Strategies for Financial and Resources Crisis: the Case of IGA Forestry Enterprise., 1995

14/6/40 (Item 4 from file: 94)
00883101 JICST ACCESSION NUMBER: 89A0243178 FILE SEGMENT: JICST-E
Development of corporate risk analyzing system based on financial data., 1988

14/6/41 (Item 1 from file: 103)
04131262 SPN-97-0B0068; EDB-97-039966
Title: Current trends towards a new regulation and evolution of fire protection systems technologies in nuclear power plants
Original Title: Tendencias actuales hacia una nueva regulacion y evolucion de la tecnica de los sistemas de proteccion contra incendios en centrales nucleares
Title: Papers presented at Congresses and Conferences: 1995
Original Title: Ponencias presentadas a Congresos y conferencias: 1995
Publication Date: 1996

14/6/42 (Item 2 from file: 103)
03952329 SPN-96-0B0126; EDB-96-036089
Title: Probabilistic safety analysis applied to RBMK reactors
Original Title: Estudio probabilista de la seguridad de los reactores RBMK
Title: Papers presented at congresses and Conferences: 1994
Original Title: Ponencias presentadas a Congresos y Conferencias: 1994
Publication Date: 1995

14/6/43 (Item 3 from file: 103)
03819382 EDB-95-063150
Title: Barycentric approximation in financial decision making
Title: Mathematical programming: State of the art 1994
Conference title: 15. international symposium on mathematical programming
Publication Date: 1994

14/6/44 (Item 4 from file: 103)
03769984 NEDO-94-912975; INS-95-001245; EDB-95-013752
Title: Organization and management activities in the nuclear power industry
Title: Proceedings of the Twenty-First Water Reactor Safety Information Meeting: Volume 1, Plenary session; Advanced reactor research; advanced control system technology; advanced instrumentation and control hardware; human factors research; probabilistic risk assessment topics; thermal hydraulics; thermal hydraulic research for

advanced passive LWRs
Conference title: 21. water reactor safety information meeting
Publication Date: Apr 1994

14/6/45 (Item 5 from file: 103)
03759391 EDB-95-003159
Title: Experimental evaluation of traffic load on buried gas pipelines
Title: First world conference on structural control (1WCSC)
Conference title: 1. world conference on structural control (WCSC-1)
Publication Date: 1994

14/6/46 (Item 6 from file: 103)
03474448 AIX-24-033960; EDB-93-053324
Title: Insurance cost of Swedish nuclear power plants
Original Title: Foersaekringspremier foer svenska kaernkraftverk
Publication Date: 1992

14/6/47 (Item 7 from file: 103)
03135294 EDB-91-072729
Title: Total Probable Risk analysis: A technique for quantitative risk evaluation of hazardous waste disposal options
Publication Date: Sum 1989

14/6/48 (Item 8 from file: 103)
02790833 AIX-21-010295; EDB-90-008046
Title: The characteristics of risks of major disasters
Publication Date: 8 Aug 1989

14/6/49 (Item 9 from file: 103)
02789546 AIX-21-003606; EDB-90-006759
Title: Radiological risks and civil liability
Publication Date: 1989

14/6/50 (Item 10 from file: 103)
02066285 INS-88-000255; EDB-88-009005
Title: Price-Anderson Law - reports on Price-Anderson issues
Publication Date: 1985

14/6/51 (Item 11 from file: 103)
01317423 EPA-10-000953; EDB-84-015096
Title: Effect of tax, financing, and operating-cost incentives on retiree homeowners' current and potential decisions to purchase energy-saving improvements
Publication Date: 1983

14/6/52 (Item 12 from file: 103)
01302593 EDB-84-000264
Title: Portfolio analysis of exploration strategies
Conference title: SPE hydrocarbon economics and evaluation symposium
Publication Date: Mar 1983

14/6/53 (Item 13 from file: 103)
01199273 ERA-08-032962; EDB-83-099310
Title: Industrial viewpoint of synthetic fuels
Title: Proceedings of the eighth underground coal conversion symposium
Conference title: 8. underground coal conversion symposium
Publication Date: Nov 1982

14/6/54 (Item 1 from file: 144)
14244226 PASCAL No.: 99-0446845
Decision tree analysis and risk modeling to appraise investments on major oil field projects
MEOS 99 : managing the future : challenges for people, resources and technology : Bahrain, 20-23 February 1999
1999

14/6/55 (Item 2 from file: 144)
12761303 PASCAL No.: 96-0475307
A prophylactic implantable cardioverther-defibrillator ? Discussion
1996

14/6/56 (Item 3 from file: 144)
12747827 PASCAL No.: 96-0461032
Eliciting von Neumann-Morgenstern utilities when probabilities are distorted or unknown
1996

14/6/57 (Item 4 from file: 144)
12132073 PASCAL No.: 95-0364062
Der verhaltenssteuernde Einfluss der Arzthaftung: Auswirkungen auf die Technologiewahl
(The influence of the physician's professional indemnity on his attitude and behaviour: effects on the choice of technology)
1995

14/6/58 (Item 5 from file: 144)
01390748 PASCAL No.: 77-0445310
PROTECTION AGAINST LOW PROBABILITY EVENTS: A SEQUENTIAL MODEL OF CHOICE.
IN: MODELING AND SIMULATION. ANNU. PITTSBURGH CONF. 7. PROC.; PITTSBURGH; 1976
1976

14/6/59 (Item 1 from file: 239)
16622524 MR 2000a#91060
On the discounted penalty at ruin in a jump-diffusion and the perpetual

put option.
1998

14/6/60 (Item 2 from file: 239)
16427964 MR 98e#60004
Athens Conference on Applied Probability and Time Series Analysis. Vol. I.
Applied probability. In honor of J. M. Gani. Papers from the conference held in Athens, March 22--26, 1995. Edited by C. C. Heyde, Yu. V. Prohorov [Yu. V. Prokhorov], R. Pyke and S. T. Rachev.
1996

14/6/61 (Item 3 from file: 239)
16314494 MR 97e#62133
Delay in claim settlement and ruin probability approximations.

14/6/62 (Item 4 from file: 239)
16139891 MR 95j#90025
Complex economic dynamics. Vol. I.
An introduction to dynamical systems and market mechanisms. With a foreword by Paul A. Samuelson.
1994

14/6/63 (Item 5 from file: 239)
03133582 MR 89j#90002
Okonomie und Mathematik.
Economics and mathematics
Rudolf Henn zum 65. Geburtstag. [To Rudolf Henn on his 65th birthday] Edited by O. Opitz and B. Rauhut.
1987

14/6/64 (Item 6 from file: 239)
03032624 MR 88b#62193
Cost-optimal performance of special reliability tests using prior knowledge.
1986

14/6/65 (Item 7 from file: 239)
02522175 MR 81g#62147
Nonparametric estimation of functions in a model of competing risks from incomplete longitudinal data.
1979

14/6/66 (Item 1 from file: 241)
1065093 SUBFILE: EPRI TECHNICAL REPORT
Property Damage Risk Assessment Scoping Study
REPORT NUMBER: EPRI TR-108261 0152p.
CONTRACT/GRANT NO.: WO3719-04
PUBLICATION YEAR: 1997 07

14/6/67 (Item 2 from file: 241)
1064902 SUBFILE: EPRI TECHNICAL REPORT
Nuclear Property Insurance Study
REPORT NUMBER: EPRI TR-108061 0026p.
CONTRACT/GRANT NO.: WO3719-04; WO3719-08; RP3719-04; RP3719-08
PUBLICATION YEAR: 1997 06

14/6/68 (Item 3 from file: 241)
1042134 EPRI ACCESSION NO: 1633200 SUBFILE: EPRI TECHNICAL REPORT
Capital Requirements for the U.S. Investor-Owned Electric Utility Industry: 1985-2005
REPORT NUMBER: EPRI P-5830 0100p.
CONTRACT/GRANT NO.: RP1920-03
PUBLICATION YEAR: 1988 06

14/6/69 (Item 1 from file: 647)
01204615 CMP ACCESSION NUMBER: EBN19991115S0020
Chip stocks could correct next year (Wall Street Watch)
PUBLICATION DATE: 991115
WORD COUNT: 361

14/6/70 (Item 2 from file: 647)
01199786 CMP ACCESSION NUMBER: NWC19990906S0016
Orchestrating Today's E-Commerce
PUBLICATION DATE: 990906
WORD COUNT: 5342

14/6/71 (Item 3 from file: 647)
01195905 CMP ACCESSION NUMBER: EBN19990712S0003
Exploring Alternatives - A Growing Number Of Sites Offer A Variety Of Services, Ranging From Online Auctions To Detailed Catalogs To Comparative Technical Data.
PUBLICATION DATE: 990712
WORD COUNT: 10559

14/6/72 (Item 4 from file: 647)
01190912 CMP ACCESSION NUMBER: LTH19990503S0040
The Wolf At The Door - Service Providers Keep Building More Secure VPNs, And Keep Getting Blown Away By Cost, Complexity And The Criminal Mind.
PUBLICATION DATE: 990503
WORD COUNT: 2334

14/6/73 (Item 5 from file: 647)
01190735 CMP ACCESSION NUMBER: IWK19990503S0041
Get A Grasp On Knowledge
PUBLICATION DATE: 990503
WORD COUNT: 2548

14/6/74 (Item 6 from file: 647)
01183493 CMP ACCESSION NUMBER: NWC19990125S0009
The Power of Knowledge and Information (Net Results)

PUBLICATION DATE: 990125
WORD COUNT: 1520

14/6/75 (Item 7 from file: 647)
01180252 CMP ACCESSION NUMBER: CRN19981207S0190
The One That Got Away - HP's Innovation Has Slipped Off The Hook. Without It, Company Chairman And CEO Lewis Platt Could Find It Difficult To Lure Reseller, Corporate, And Wall Street Interest
PUBLICATION DATE: 981207
WORD COUNT: 1574

14/6/76 (Item 8 from file: 647)
01174864 CMP ACCESSION NUMBER: EBN19981012S0045
IC design gap feeding semiconductor glut (Executive Comment)
PUBLICATION DATE: 981012
WORD COUNT: 647

14/6/77 (Item 9 from file: 647)
01172488 CMP ACCESSION NUMBER: INW19980914S0002
Cautiously, CEOs Lead The Way
PUBLICATION DATE: 980914
WORD COUNT: 2249

14/6/78 (Item 10 from file: 647)
01157795 CMP ACCESSION NUMBER: INW19980406S0004
Linking The Supply Chain With The Cash Register (Web Value Chain)
PUBLICATION DATE: 980406
WORD COUNT: 2364

14/6/79 (Item 11 from file: 647)
01136279 CMP ACCESSION NUMBER: IWK19970825S0036
the Future is Now - Leading-edge IT managers tap into vendor R&D efforts
PUBLICATION DATE: 970825
WORD COUNT: 3208

14/6/80 (Item 12 from file: 647)
01130802 CMP ACCESSION NUMBER: IWK19970707S0046
Visible Means Of Support - Building a support architecture for enterprise systems before they roll out reduces the risk of project failure
PUBLICATION DATE: 970707
WORD COUNT: 2162

14/6/81 (Item 13 from file: 647)
01124892 CMP ACCESSION NUMBER: CWK19970505S0040
YEAR 2000 COUNTDOWN - Protect Your Net!
PUBLICATION DATE: 970505
WORD COUNT: 2068

14/6/82 (Item 14 from file: 647)
01103771 CMP ACCESSION NUMBER: VAR19960915S0031

Building The Enterprise Network - Internetworking offers big-ticket product sales and high-service revenue for VARs who can handle its challenges
PUBLICATION DATE: 960915
WORD COUNT: 1640

14/6/83 (Item 15 from file: 647)
01102514 CMP ACCESSION NUMBER: CRN19960909S0096
Internet security: What measures can be taken?
PUBLICATION DATE: 960909
WORD COUNT: 8909

14/6/84 (Item 16 from file: 647)
01097555 CMP ACCESSION NUMBER: VAR19960715S0037
Lotus-Notable For Its Groupware Platform - At the heart of IBM's network-centric computing strategy, Notes is worth a gamble
PUBLICATION DATE: 960715
WORD COUNT: 721

14/6/85 (Item 17 from file: 647)
01080160 CMP ACCESSION NUMBER: IWK19960129S0033
Disaster Prevention - New Software Fights Fires - Insurance cooperative helps telcos reduce risk of network damage
PUBLICATION DATE: 960129
WORD COUNT: 855

14/6/86 (Item 18 from file: 647)
01065805 CMP ACCESSION NUMBER: EBN19950925S0088
Top Purchasers - The Heavy Hitters (Opinion)
PUBLICATION DATE: 950925
WORD COUNT: 2976

14/6/87 (Item 19 from file: 647)
01059100 CMP ACCESSION NUMBER: CRN19950717S0134
Channel Exec Forum Mulls Win 95 Rollout Challenges - Some expect limited corporate migration within 90 days (a look inside)
PUBLICATION DATE: 950717
WORD COUNT: 1796

14/6/88 (Item 20 from file: 647)
01035784 CMP ACCESSION NUMBER: NWC19941115S0019
The ATM Deskset
PUBLICATION DATE: 941115
WORD COUNT: 1016

14/6/89 (Item 21 from file: 647)
01022971 CMP ACCESSION NUMBER: CRN19940516S2714
Portrait of Japanese computer companies - Juggling cultures in a global marketplace
PUBLICATION DATE: 940516
WORD COUNT: 5365

14/6/90 (Item 22 from file: 647)
00645118 CMP ACCESSION NUMBER: CRN19890424S1990
Businessland Upside Potential Limited Near Term
PUBLICATION DATE: 890424
WORD COUNT: 1994

14/6/91 (Item 23 from file: 647)
00642417 CMP ACCESSION NUMBER: IWK19890814S2964
Unum: Divide And Conquer - A huge database enabled this insurer to build on niches in the market
PUBLICATION DATE: 890814
WORD COUNT: 1574

14/6/92 (Item 24 from file: 647)
00641330 CMP ACCESSION NUMBER: IWK19891002S1873
EIS Powers Executives - America's corporate top brass is flocking to Ann Arbor to see if Comshare's system lives up to its reputation
PUBLICATION DATE: 891002
WORD COUNT: 3509

14/6/93 (Item 25 from file: 647)
00637568 CMP ACCESSION NUMBER: CWK19890424S1508
Peter Sevcik compares a carrier who sells hybrid network management-management of combined public and private networks-to a t...
PUBLICATION DATE: 890424
WORD COUNT: 1543

14/6/94 (Item 26 from file: 647)
00607500 CMP ACCESSION NUMBER: CRN19911014S2916
JANUARY 1991
PUBLICATION DATE: 911014
WORD COUNT: 4744

14/6/95 (Item 27 from file: 647)
00566792 CMP ACCESSION NUMBER: CWK19900319S2263
Talking About Integration
PUBLICATION DATE: 900319
WORD COUNT: 5109

14/6/96 (Item 28 from file: 647)
00546791 CMP ACCESSION NUMBER: CRN19930712S5149
MOVING AHEAD IN THE 1990s - Execs debate tech support
PUBLICATION DATE: 930712
WORD COUNT: 5257

14/6/97 (Item 29 from file: 647)
00517762 CMP ACCESSION NUMBER: OST19920427S1919
A Sun Exec Explains Sun Pro

PUBLICATION DATE: 920427
WORD COUNT: 4504

?t s14/7/9,19,20,21,24,40

14/7/9 (Item 9 from file: 2)
DIALOG(R)File 2:INSPEC

4585647 INSPEC Abstract Number: C9403-6170-026
Title: Examples of causal probabilistic expert systems
Author(s): Noormohammadian, M.; Oppel, U.G.
Author Affiliation: Math. Inst. & Ludwig, Maximilians-Univ., Munchen, Germany
Conference Title: Symbolic and Quantitative Approaches to Reasoning and Uncertainty. European Conference ECSQARU '93 Proceedings p.290-5
Editor(s): Clark, M.; Kruse, R.; Moral, S.
Publisher: Springer-Verlag, Berlin, Germany
Publication Date: 1993 Country of Publication: West Germany x+390 pp.
ISBN: 3 540 57395 X
Conference Date: 8-10 Nov. 1993 Conference Location: Granada, Spain
Language: English Document Type: Conference Paper (PA)
Treatment: Applications (A); Theoretical (T)
Abstract: Presents examples of expert systems which are based on single causal probability network (CPNs) and on sequences of adapted and controlled CPNs and which are constructed and operated using the shell HUGIN. They are applied to risk analysis in genetics, diagnosis of the stock market, claims reserving, evaluation of multisensor systems, and diagnosis and prognosis of metabolic processes. (13 Refs)

14/7/19 (Item 2 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

02098532 E.I. Monthly No: EIM8606-040394
Title: EXPERT SYSTEM FOR FOREIGN CURRENCY HEDGING.
Author: Star, Spencer
Corporate Source: Univ Laval, Que, Can
Conference Title: 1985 ACM Thirteenth Annual Computer Science Conference.
Conference Location: New Orleans, LA, USA Conference Date: 19850312
Sponsor: ACM, New York, NY, USA
E.I. Conference No.: 07113
Source: Publ by ACM, New York, NY, USA p 421
Publication Year: 1985
ISBN: 0-89791-150-4
Language: English
Document Type: PA; (Conference Paper)
Journal Announcement: 8606
Abstract: International corporations present their financial statements in terms of a single currency, often based on the currency of the home office or on the dollar, even though a large part of their foreign operations are completed using other currencies. Unancticipated moves in the volatile foreign exchange markets can severely distort the year-end results, sometimes causing large losses in an otherwise profitable year. Recent innovations in the markets for foreign currency futures and options allow corporations to implement complex hedging strategies to reduce foreign exchange risk. A good hedging strategy requires both a statistical

analysis and expert judgment as to how to combine this analysis with specific corporate foreign currency demands and the desire for reduced risk. This paper is a progress report on our attempt to build an expert system to make decisions on hedging strategies that reduce foreign exchange risk. An original aspect of our approach is that we will analyze the reactions of experts to a simulated market to determine the rules in our knowledge base. The expert system's performance will be verified by analyzing its decisions in a simulated market. (Author abstract)

14/7/20 (Item 3 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

01354788 E.I. Monthly No: EI8305032738 E.I. Yearly No: EI83019153
Title: Risk Analysis Oriented towards Financial and Technical Control.
Title: L'ANALYSE DE RISQUE VERS UNE MAITRISE FINANCIERE ET TECHNIQUE.
Author: Deschanels, Jean Louis; Lavedrine, Pierre
Corporate Source: Aerospatiale
Source: RGE, Revue Generale de l'Electricite n 6 Jun 1982, Journ d'Etud SEE La Surete de Fonct dans les Syst Ind Autom, Gif-sur-Yvette, Fr, Jun 4 1981 p 445-447
Publication Year: 1982
CODEN: RGELAC ISSN: 0035-3116
Language: FRENCH
Journal Announcement: 8305
Abstract: Any automated system, whatever the functions it must perform during all its life, presents risks of failure and may even be the origin of serious accidents or " dreaded events " . All these risks may cause significant financial losses. So, they must be allowed for as early as at the system stage. Though an objective of the security scheme is to optimize the system for a tradeoff between performance capabilities and costs, the objective of security entails defining the list of " dreaded events " , their level of acceptability and their probability of occurrence. The financial analysis of risks therefore consits in searching for the cost figure for residual losses due to any prospective accident occurring to the system in order to accept the whole risk of these losses or to define measures that permit financial control of these losses, either by a preventive policy, a protection policy or an insurance policy. In French.

14/7/21 (Item 4 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

01165036 E.I. Monthly No: EI8212111968 E.I. Yearly No: EI82085955
Title: MANAGING RISKS PART OF SUCCESS.
Author: Zier, Robert E.
Corporate Source: MITRE Corp, McLean, Va, USA
Source: Solid Wastes Management v 25 n 5 May 1982 p 64-66, 68, 106
Publication Year: 1982
CODEN: SWAMDJ
Language: ENGLISH
Journal Announcement: 8212
Abstract: Resource recovery systems involve risks, not only on the part of private industry but on the part of government as well. The risk of exposure to financial loss results from a variety of potential causes such as failure of the technology, unanticipated environmental requirements and

the occurrence of natural disasters which can damage the facility or shut it down. Learning to handle these risks is essential to a successful project. For resource recovery projects, the occurrence of a risk can result in two undesirable outcomes for a municipal government: the cost of the system, or at least the cost of solid waste disposal, can exceed an acceptable figure; or needed capacity for solid waste disposal becomes unavailable. Identification of risk pinpoints the possible causes of undesirable outcomes and the corresponding probability of occurrence. Risk reduction is achieved by reducing either the probability of the occurrence of a risk or the impact of an undesirable outcome. Risk allocation is assigning responsibility for controlling the cause and accepting responsibility for possible undesirable outcomes. The article discusses private sector risks, debt responsibility, risk sharing, and other aspects of the subject.

14/7/24 (Item 3 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

07559345 Genuine Article#: 181FE Number of References: 116
Title: Risk and dangerousness
Author(s): Buchanan A (REPRINT)
Corporate Source: INST PSYCHIAT,DEPT FORENS PSYCHIAT, DE CRESPIGNY PK/LONDON SE5 8AF//ENGLAND/ (REPRINT)
Journal: PSYCHOLOGICAL MEDICINE, 1999, V29, N2 (MAR), P465-473
ISSN: 0033-2917 Publication date: 19990300
Publisher: CAMBRIDGE UNIV PRESS, 40 WEST 20TH STREET, NEW YORK, NY 10011-4211
Language: English Document Type: REVIEW
Abstract: The task of improving the ability of clinicians to predict which of their patients will be violent has come to be seen as one of establishing the relative merits of actuarial and clinical prediction. The meaning of these terms is unclear. 'Clinical' is usually defined by exclusion, that is, as something other than actuarial. The term 'actuarial' is often used to refer to the techniques of risk prediction in financial services. In the psychiatric and psychological literature relating to the assessment of dangerousness, three further meanings have emerged. That whereby actuarial refers to any mathematical means of combining information is the most widely accepted. Whichever definition is employed, the conclusion of most reviews has been that the future is actuarial. It is argued here that, while mathematical approaches have been successful in showing that risk factors for violence in the general population apply also to the mentally disordered, important questions remain unanswered. Mathematical methods address only one form of probability, that which arises from chance. A development of another form of probability, that which ar ises from causes, offers the prospect of improved risk assessment in psychiatry. It also offers a definition of clinical prediction that is not based on exclusion.

14/7/40 (Item 4 from file: 94)
DIALOG(R)File 94:JICST-EPlus

00883101 JICST ACCESSION NUMBER: 89A0243178 FILE SEGMENT: JICST-E
Development of corporate risk analyzing system based on financial data.

YOSHIDA TOSHIHIRO (1); TAKAMATSU KOSUMO (1)
(1) Mitsubishi Res. Inst. Inc.
Mitsubishi Sogo Kenkyujo Shoho(Journal of Mitsubishi Research Institute), 1988, NO.15, PAGE.90-113, FIG.18, TBL.10, REF.16
JOURNAL NUMBER: S0866AAY ISSN NO: 0287-2129
UNIVERSAL DECIMAL CLASSIFICATION: 657.44 681.3:007.51
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication
ABSTRACT: Quantitative analysis of financial statements has been playing a critical role in the field of corporate assessment for nearly a century, mainly because of its high objectivity. In recent years, advances in computer technologies have made software packages for advanced statistical analysis widely available and have also enabled computers to do qualitative reasoning. This stimulates the systematization of financial analysis. Meanwhile, drastic changes in management environment after the Oil Crisis in 1973 have caused an increase in various kinds of risk in both private and public sectors. This problem has made the industries keenly aware of the importance of risk management. Considering these situations, we started a project which aims at examining financial analysis in the framework of risk management, proposing a conceptual design of a supporting system for risk management, and developing a prototype system. The designed system consists of two parts: (1) the statistical analysis component that detects something unusual from the movement of some pre-defined monitoring indices, and (2) the expert system component that infers reasons of the anomaly and suggests measures to cope with the situation. The system is characterized by its unique hybrid structure combining a conventional statistical method and emerging Artificial Intelligence methods. In spite of a fairly limited knowledge and functon covered by the prototype, this system seems to have a quite effective analyzing ability. In the case of RICCAR Corporation, one of the largest sewing machine makers in Japan, the system indicated defects in sales activity of the firm four years before its bankrupcy. A succeeding project with a goal of developing an enhanced knowledge based and practical system is now underway.(author abst.)

?t s14/7/6,8,32,33,36,62,63,64,65,73,74,92

14/7/6 (Item 6 from file: 2)
DIALOG(R)File 2:INSPEC

4995552 INSPEC Abstract Number: B9508-0160-009
Title: From determinism to probabilism
Author(s): van Otterloo, R.W.
Author Affiliation: N.V. KEMA Arnhem, Netherlands
Journal: Microelectronics and Reliability vol.35, no.9-10 p.1357-62
Publication Date: Sept.-Oct. 1995 Country of Publication: UK
CODEN: MCRLAS ISSN: 0026-2714
U.S. Copyright Clearance Center Code: 0026-2714/95/$9.50+.00
Language: English Document Type: Journal Paper (JP)
Treatment: General, Review (G)
Abstract: Probabilistic risk assessment (PRA) is to a certain extent a luxury. It is a luxury that is applied in the margin of large projects where decisions making is very important and involves the safety of large groups of people or the possibility of causing environmental damage or a

large loss of financial investments. The field of application of PRA is therefore restricted. There is just one way of enlarging the application field and that is by further automation for the PRA techniques. Further automation makes PRA's cheaper and therewith will small margins appear large enough. (0 Refs)

14/7/8 (Item 8 from file: 2)
DIALOG(R)File 2:INSPEC

4931938 INSPEC Abstract Number: C9506-1290D-006
Title: Martingale analysis for assets with discontinuous returns
Author(s): Bardhan, I.; Chao, X.
Author Affiliation: Goldman Sachs & Co., New York, NY, USA
Journal: Mathematics of Operations Research vol.20, no.1 p.243-56
Publication Date: Feb. 1995 Country of Publication: USA
CODEN: MOREDQ ISSN: 0364-765X
U.S. Copyright Clearance Center Code: 0364-765X/95/2001/0243/$01.25
Language: English Document Type: Journal Paper (JP)
Treatment: Theoretical (T)
Abstract: The equivalent martingale measure approach is applied to a financial market subject to jump-diffusion uncertainty. The uncertainty in the market is caused by a multidimensional Brownian motion process and a multidimensional point process of jumps admitting stochastic intensity. Under a boundedness condition on the relative risk premium on jumps, an equivalent risk-neutral probability measure is identified and is used to construct hedging portfolios for consumption processes and contingent claims. These are then applied to problems of utility maximization. (18 Refs)

14/7/32 (Item 11 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

05074634 Genuine Article#: TN531 Number of References: 37
Title: THE PRODUCTIVITY OF FINANCIAL INTERMEDIATION AND THE TECHNOLOGY OF FINANCIAL PRODUCT MANAGEMENT
Author(s): HOLMER MR; ZENIOS SA
Corporate Source: HR&A INC/WASHINGTON//DC/00000; UNIV CYPRUS,SCH ECON & MANAGEMENT/NICOSIA//CYPRUS/
Journal: OPERATIONS RESEARCH, 1995, V43, N6 (NOV-DEC), P970-982
ISSN: 0030-364X
Language: ENGLISH Document Type: ARTICLE
Abstract: Financial intermediaries-banks thrifts, and life insurance companies-have experienced low productivity over the last decade or two. Low productivity has manifested itself as a declining market share of their products relative to capital market assets. In some cases, low productivity caused a failure to meet contractual obligations embodied in their financial products. These failures resulted in customer losses, and/or taxpayer losses when failed intermediaries were guaranteed by government agencies. This productivity problem has been analyzed mostly from an economic science perspective, by R. C. Merton (1990) and Z. Bodie (1990). The focus of the economic analysis is the improvement of regulatory measures for intermediaries whose financial

products are guaranteed by government agencies. In this paper we take a management science perspective by focusing on the technology of financial product management. An assessment of current technologies finds that their use can leave financial intermediaries exposed to substantial risks. An improved technology-integrated product management (IPM)-is suggested that enables intermediaries to increase productivity. Therefore, they can respond more effectively to market pressures from competing capital market assets and to regulatory pressures from government agencies. Technical and organizational aspects of integrated product management are described, and its application to three examples is discussed. The problem outlined here presents a major challenge to management scientists. It is an example of the service-sector applications that A. Geoffrion (1992) addressed in his 1991 Omega Rho lecture.

14/7/33 (Item 12 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

04145498 Genuine Article#: RH715 Number of References: 37
Title: THE STRUCTURAL RELATIONSHIP BETWEEN FINANCIAL RATIOS AND CAPITAL-ASSET PRICING
Author(s): OSTERMARK R; AALTONEN J
Corporate Source: ABO AKAD UNIV,INST ADV MANAGEMENT SYST RES,DEPTBUSINESS ADM,HENRIKSGATAN 7/SF-20500 TURKU//FINLAND/
Journal: INTERNATIONAL JOURNAL OF SYSTEMS SCIENCE, 1995, V26, N5 (MAY), P 1129-1152
ISSN: 0020-7721
Language: ENGLISH Document Type: ARTICLE
Abstract: The relationship between financial statement information and security market information has been the subject of intensive theoretical and empirical research. The bulk of empirical studies consider this relationship without an explicit consideration of causality. In the present study we put forward some novel results concerning the direction of causality between these two information sets. Our results indicate that the accrual information in financial statements has some projective value with respect to future reactions on the security markets.

14/7/36 (Item 15 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

02281168 Genuine Article#: KQ176 Number of References: 24
Title: ON KNOWLEDGE REPRESENTATION IN BELIEF NETWORKS
Author(s): ABRAMSON B
Corporate Source: UNIV SO CALIF,DEPT COMP SCI/LOS ANGELES//CA/90089
Journal: LECTURE NOTES IN COMPUTER SCIENCE, 1991, V521, P86-96
ISSN: 0302-9743
Language: ENGLISH Document Type: ARTICLE
Abstract: Three focal elements of knowledge-based system design are (i) acquiring information from an expert, (ii) representing the information in a system-usable form, and (iii) using the information to draw inferences about specific problem instances. In the artificial intelligence (AI) literature, the first element is referred to as knowledge acquisition, while the second and third are embodied in a

system's knowledge base and inference engine, respectively. AI, however, is not alone in its concern for these issues. Researchers in several of the statistical decision sciences, notably decision analysis (DA), have also investigated them. This paper discusses the use of belief networks-a formalism that lies somewhere between AI and DA-as an overall framework for knowledge-based systems. Unlike previous work, which has concentrated on either the networks' mathematical properties or on their implementation as a specific system, this paper is oriented towards the concerns of general system design. Concrete examples are drawn from one medical system (Pathfinder) and from one financial system (ARCO1), and in particular, from a consideration of their similarities and differences. The design principles abstracted from these systems suggests a powerful, coherent design philosophy guided by the simple thought: form follows function.

14/7/62 (Item 4 from file: 239)
DIALOG(R)File 239:Mathsci(R)

16139891 MR 95j#90025
Complex economic dynamics. Vol. I.
An introduction to dynamical systems and market mechanisms. With a foreword by Paul A. Samuelson.
Day, Richard H. (Department of Mathematics, University of Southern California, Los Angeles, California, 90007)
Contributors: Samuelson, Paul A.
Corporate Source Codes: 1-SCA
Publ: MIT Press, Cambridge, MA,
1994, xxiv+309 pp. ISBN: 0-262-04141-3
Price: $37.50.
Language: English Summary Language: English
Document Type: Book
Journal Announcement: 9416
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (85 lines)
The word ``complex'' in the title of the book under review has nothing to do with the complex numbers. Day distinguishes simple models from complex ones and simple dynamics from complex dynamics. Simple (economic) models with simple dynamics are the type of model studied in (economic) textbooks. Governments often base their policies on predictions of a central planning board. These CPBs often base their predictions on complex models, but with simple dynamics. Predictions have a ``local'' character, as they are made only for a small neighbourhood of the relevant parameters. As such, the functions describing the developments of the economy can be chosen to be linear. Complex dynamics, such as chaotic dynamics, are only possible with nonlinear functions. Day's book deals with simple models, but with complex dynamics.

I have written several reviews on chaotic dynamics, although I have never used it in my own research. Every time I have written such a review, I have pointed out that the occurrence of chaotic dynamics in economic models should be based on economic assumptions. The wrong way to deal with it is to make some unrealistic, ad hoc assumptions that lead to well-understood models in other sciences. Every time I wrote that, I had in mind a special model of the author [Amer. Econ. Rev. 72 (1982), no. 3, 406--414]. I must admit when I started reviewing this book I was prejudiced. Reading the book has taken part, but not all, of the prejudice away.

There are two pitfalls for authors of books on mathematical economics in general, and in particular, for those of books on complex economic dynamics. Either the mathematics is too difficult for the average economist, or the economics is too difficult for the average mathematician. This book, the first of two volumes, deals with economic applications only in the last part. The economic examples of the last part are an interesting illustration of the mathematical theory of the second part. It is a pity that this part is rather short. More applications are promised in the second volume, which has not yet been published. Day's book will not be too difficult for the average economist who has some familiarity with, but not necessarily an advanced knowledge of, mathematical modelling. Proofs are given only in the simple cases, sketches of proofs for the slightly more difficult ones and only a statement of the results for the more complicated cases.

Doubtless Day saw, at an early date, the possibilities of applying nonlinear and chaotic dynamics to economics. He has since then been working on the subject and has stimulated others to do the same. It is a good thing he has written about his experience in a book. The book under review contains three parts. The first part is a philosophical and methodological introduction. There are a striking number of references to the literature on physics, as if Day regrets he studied economics.

The second part of the book deals with the mathematics of discrete, one-dimensional (semi)dynamical systems. All the familiar subjects: stability, instability, cycles, chaos, bifurcation, itineraries, ergodicity, the Frobenius-Perron operator, the Schwarzian derivative, etc., are there. The section on ``multiple phase'' and ``statistical'' dynamics is rather extensive. In the former, the transition map has different analytical expressions on different regions of the domain. Piecewise linear (affine) maps are an example of these. This part is a fine introduction to the subject; however, to those interested, I would recommend P. Collet and J.-P. Eckmann [Iterated maps on the interval as dynamical systems, Birkhauser, Boston, MA, 1980; MR 82j:58078] which covers most of the subjects dealt with in this part of Day's book as well as giving all proofs.

The third and last part of this volume deals with economics. It was in reading this part that from time to time the feeling that caused my prepossession popped up again. The first chapter of this part deals with Walras' tatonnement. Stability of the competitive system was the topic in the fifties. The Sonneschein, Mantel and Debreu theorem shows that all continuous, homogeneous functions of degree zero that satisfy Walras' law can be the excess demand function of an economy. As such, ``pathological examples'' cannot be excluded from economic theory. Moreover, the tatonnement process is not a realistic presentation of reality. Day shows that even in a very simple way, chaos can be introduced in the tatonnement model.

The second chapter of this part introduces a mediator between suppliers and demanders in the tatonnement process. With this mediator, the model becomes more natural. Further, the stock market is explained by this model. It leads to the interesting, but not new, conclusion that theoretical data generated by a deterministic process cannot be distinguished from actual data generated by a stationary stochastic process. The final chapter introduces financial feedbacks to the tatonnement model, which is treated as a `cobweb' model in this chapter.

Reviewer: Furth, Dave (Amsterdam)

Review Type: Signed review

14/7/63 (Item 5 from file: 239)

03133582 MR 89j#90002
Okonomie und Mathematik.
Economics and mathematics
Rudolf Henn zum 65. Geburtstag. [To Rudolf Henn on his 65th birthday]
Edited by O. Opitz and B. Rauhut.
Contributors: Opitz, O.; Rauhut, B.; Henn, Rudolf
Publ: Springer-Verlag, Berlin-New York,
1987, xxxiv+648 pp. ISBN: 3-540-17819-8
Price: DM 128.00.
Language: German
Document Type: Book; Proceedings
Journal Announcement: 2108
Economics and mathematics; Okonomie und Mathematik ; Birthday: Henn, Rudolf
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (165 lines)
Contents:\ M. Beckmann, W. Eichhorn, W. Krelle, O. Opitz and B. Rauhut, Publikationen und Editionen von Rudolf Henn [Publications and editions by Rudolf Henn] (pp.\ v--ix).

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Section 6. Microeconomics:\ Horst Albach, Bernd Franke and Michael Werhahn, Bemerkungen zur Theorie der Investitionsketten [Remarks on the theory of investment chains] (pp.\ 375--380); Gunter Bamberg and Franz Baur, Commodity futures markets and the level of production (pp. 381--395); Wolfgang Gaul, Zum Einsatz von Datenanalysemethoden in der Marktforschung [The application of data analysis methods in market research] (pp. 396--408); Hermann Goppl, Neue Instrumente zum Management finanzieller Risiken [New instruments for the management of financial risks] (pp. 409--415); Gerhard Hieber, Uberlegungen zum Informationsmanagement im Bankgeschaft [Considerations on information management in banking] (pp. 416--419); Peter Kischka, Risikoeinschatzung und optimaler Versicherungsschutz: einige Anmerkungen [Risk evaluation and optimal insurance protection: some remarks] (pp. 420--428); Arnold Kremer, Der Einfluss der Zinsstruktur auf die Ertragsentwicklung einer genossenschaftlichen Zentralbank---Eine okonometrische Analyse [The influence of the interest structure on the profit development of a cooperative central bank---an econometric analysis] (pp. 429--444); Egon

Kremer, Finanzinnovationen und ihre Akzeptanz auf den internationalen Markten [Financial innovations and their acceptance in international markets] (pp. 445--460); Reimer Schmidt, Zur jungeren Entwicklung der Versicherungswissenschaften [On the recent development of the insurance sciences] (pp. 461--475); Robert Schwebler, Konjunkturprognosen und Versicherungswirtschaft [Economic predictions and the economics of insurance] (pp. 476--486); Franz Steffens, Technische Optimierung und Nettobedarfsbildung in isotonen Input-Output-Systemen [Technical optimization and formation of net needs in isotonic input-output systems] (pp. 487--503); Klaus Zoller, Koordination und Wirtschaftlichkeit in Mehrprodukt-Lagern [Coordination and efficiency in multiproduct warehouses] (pp. 504--512).

Section 7. Macroeconomics and public economics:\ Klaus Ballarini and Georg Bol, Investition und gleichgewichtiges Wachstum bei konstantem Arbeitsangebot [Investment and equilibrium growth with constant employment opportunity] (pp. 515--522); Wolfgang Eichhorn and Frank Stehling, Eine Bemerkung zur Verteilungsneutralitat der produktivitatsorientierten Lohnpolitik [A remark on the distribution neutrality of productivity-oriented wage policy] (pp. 523--532); Rolf H. Funck, Jan S. Kowalski and Reiner Koblo, New technology, innovative activities, and the German city system (pp. 533--543); Klaus Hellwig, Die Erhaltung der volkswirtschaftlichen Leistungsfahigkeit [The preservation of the productivity of the national economy] (pp.\ 544--548); Alexander Karmann, Karl-Heinz Ketterer and Gholamreza Nakhaeizadeh, Zu den Beziehungen zwischen Geldmenge und Gesamtnachfrage---einige Ergebnisse einer Kausalitatsuntersuchung [On the relations between monetary supply and total demand---some results of a causality investigation] (pp. 549--557); Hartmut Kogelschatz, Zur Preisentwicklung erschopfbarer Ressourcen [On the price development of exhaustible resources] (pp. 558--565); Wilhelm Krelle, Structural change induced by foreign trade. What are the advantages for the country? (pp. 566--598); Gerhard Seiler, Kommunale Finanzplanung als Aufgabe des Operations Research [Communal financial planning as a task of operations research] (pp.\ 599--609); Klaus Spremann, Zur Okonomie des Heldentums [On the economics of heroism] (pp. 610--617); Armin Schmiedeberg and Joachim Voeller, Formale und inhaltliche Gleichheit---zur Antinomie verfassungsrechtlicher Grundprinzipien [Formal and intuitive equality---on the antinomy of fundamental constitutional principles] (pp. 618--634); Manfred Zach, Neue Technologien und Beschaftigung. Ist Technologiepolitik beschaftigungsfeindlich? [New technologies and employment. Is technology policy inimical to employment?] (pp. 635--642).

Section 8. Economic science and praxis:\ Achim Zink, Wirtschaftswissenschaft und Praxis [Economic science and praxis] (pp. 645--648).

{Most of the papers are being reviewed individually.}\

Reviewer: Editors

Review Type: Table of contents

14/7/64 (Item 6 from file: 239)

DIALOG(R)File 239:Mathsci(R)

03032624 MR 88b#62193

Cost-optimal performance of special reliability tests using prior knowledge.

Wachtler, Michael (Sektion der Mathematik, TH Karl-Marx-Stadt, 9000 Karl-Marx-Stadt, German Democratic Republic)

Corporate Source Codes: DDR-THKM

Statistics
Statistics. A Journal of Theoretical and Applied Statistics, 1986, 17
, no. 1, 87--103. ISSN: 0233-1888
Language: English
Document Type: Journal
Journal Announcement: 1808
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: SHORT (9 lines)
Summary: ``We formulate a general statistical decision problem for reliability investigations and its specification for reliability tests with test period terminated by time and failures. The risk function includes the experimental costs as well as the expected financial expenses caused by the decisions, interpreted as `rejection' and `acceptance', which are to be made when the test result is given. Under the assumption that the lifetime distribution of the items to be tested is exponential, we evaluate the Bayes risk for a wide class of prior distributions."
Reviewer: Summary
Review Type: Abstract

14/7/65 (Item 7 from file: 239)
DIALOG(R)File 239:Mathsci(R)

02522175 MR 81g#62147
Nonparametric estimation of functions in a model of competing risks from incomplete longitudinal data.
Mode, Charles J.
Math. Biosci.
Mathematical Biosciences. An International Journal, 1979, 45, no. 1-2, 1--20. ISSN: 0025-5564 CODEN: MABIAR
Language: English
Document Type: Journal
Journal Announcement: 1122
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (37 lines)
The classical competing risk problem is concerned with assessing the distribution of the random variable T{in}(0, {infin}), representing time to death (or breakdown, etc.), while at the same time keeping track of I=(1, ... ,k), representing cause of death. Thus, let G(t)=P(T <= t) and G {sub}i(t)=P(T <= t, I=i); the states 1, ... ,k are assumed to be mutually exclusive and exhaustive, so that G(t)=G{sub}1(t)+ ...+G{sub}k(t). The author studies the problem of estimating the G{sub}i under the assumption that T has a discrete distribution and that each item (or individual) under study has a preassigned "cut-off" time at which it is censored away, if it has not yet broken down. In this framework, the estimation problem reduces to a combination of standard multinomial situations. Least-squares and maximum likelihood solutions as well as their large-sample properties are then fairly standard (although the author has chosen to provide a rather elaborate treatment). The paper seems somewhat out of touch with the current strong interest in the competing risk problem. A comprehensive study of nonparametric estimation of the G{sub}i in continuous time under quite arbitrary kinds of censorship was given by O. Aalen (Ann. Statist. 6 (1978), 534 - 545; MR 57 #17987). One interpretation of the G{sub}i is that they are derived from postulated independent "latent failure times" T{sub}i, so that T=min(T{sub}1, ... ,T {sub}k) and G{sub}i(t)=P(T{sub}i <= T{sub}j, j{neq}i, T{sub}i <= t). This approach is summarized in the recent monograph by H. A. David and M. L.

Moeschberger (The theory of competing risks, Griffin, London, 1978). However, D. R. Cox, in a review of David and Moeschberger's book (Internat. Statist. Rev. 48 (1980), no. 2, 234 - 235), as well as, among others, R. L. Prentice et al. (Biometrics 34 (1978), no. 4, 541 - 554), pointed out that the hazard rates lambda {sub}i(t)=lim{sub}(h{arrd}0)(1/h)P(T{sub}i <= t+h {vert} T > t) are well defined without the independence assumption and therefore better suited as fundamental objects of the statistical inference. In the paper under review these points are only briefly and incompletely raised.
Reviewer: Keiding, Niels (Copenhagen)
Review Type: Signed review

14/7/73 (Item 5 from file: 647)
DIALOG(R)File 647:CMP Computer Fulltext

01190735 CMP ACCESSION NUMBER: IWK19990503S0041
Get A Grasp On Knowledge
Jeff Angus of InformationWeek Labs, and John Balla and Jennifer Harty of Doculabs
INFORMATIONWEEK, 1999, n 732, PG65
PUBLICATION DATE: 990503
JOURNAL CODE: IWK LANGUAGE: English
SECTION HEADING: InformationWeek Labs
TEXT:

An integrated knowledge-management product does more than just capture expertise-it becomes a way of doing business.

Intraspect Knowledge Server 2.0 and Livelink 8.0 provide almost everything.

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Knowledge management is more of a concept, a way of doing business, than it is a type of product. That concept is made possible by four basic processes: gathering, organizing, refining, and disseminating. Gathering brings information and data into the system. Organizing associates items with subjects, giving them context. Refining adds value by discovering relationships, performing synthesis, and abstracting. Disseminating gets knowledge to the people who can use it in a form that makes it usable. I Knowledge solutions require all four processes, though they don't require that all of them be accomplished through information technology. By integrating the four processes, the solution should not only provide the data on which decisions are based, but also put it in context and distribute it to a large set of users. I The most frequently missing connection in past knowledge-management solutions has been between the refining process and the other three factors. Most "knowledge" offerings come from either the specialized refining-tools companies (producers of online analytical processing clients or data mining front ends) or companies focused on delivery or search. Knowing which processes a knowledge- management product supports will help you figure out what other ingredients you'll need. I The two products we looked at, Intraspect Software Inc.'s Intraspect Knowledge Server 2.0 and Open Text Corp.'s Livelink Intranet 8.0, cover three of the four knowledge-management processes with their intrinsic technology, they leave out refinement but enable some human refinement processes. Both are among the most fully

evolved knowledge-management platforms on the market. Both will be appropriate in their current state for many companies looking for knowledge-management products.

Intraspect Knowledge Server 2.0

More than other knowledge-management technologies, Intraspect Knowledge Server is designed to integrate with users' business processes, letting them capture knowledge in the context in which the knowledge was used. The system provides a turnkey collaborative environment that provides organizations an easy way to access, track, and share enterprise data. It also lets users easily add knowledge to their organization's "group memory" as part of their usual work processes.

The company is aiming its product at large businesses, focusing on the telecommunications, pharmaceutical and health, financial services, and manufacturing industries. Intraspect sells its products directly and through resellers and system integrators.

Intraspect is a collaborative environment for collecting, finding, and reusing information in an organization, letting knowledge workers create and maintain a knowledge store or "group memory" of their work. One of Intraspect's major business applications is the "collaborative corporate portal," a personalized interface to the information used by people in an organization, organized by its context of use. In a typical portal application, users subscribe to the information they need, working collaboratively with that information within business processes.

A major differentiator for Intraspect is its collaborative approach to content management. An organization's knowledge workers create the hierarchies and add the content-unlike many other systems, which assign these responsibilities to an administrator or knowledge manager. With Intraspect, users with the proper permission can create their own organizational hierarchy (or context) within the group memory and add the content they deem appropriate. Groups can also establish their own set of contexts. Organizations can choose from a wide variety of knowledge-management applications, ranging from centrally controlled catalog servers to highly distributed group memories.

The system is also very flexible, letting users subscribe to only the portions of the group memory that are vital to their tasks. Users can subscribe to specific searches (for example, searches that identify business topics), discussions, messages, documents, Web pages , comments, and folders.

The system is both Windows- and Web browser-compliant, and will be easy to learn for users who are comfortable in either environment. Moreover, administrators can perform all their management tasks remotely, via the Web.

Intraspect is tightly integrated with the desktop environment, including applications such as Microsoft Office and most E-mail systems. Users can capture any digital content, whether from business- intelligence systems, data warehouses, enterprise resource planning systems, or customer-relationship management systems, as well as file systems, Web pages, or E-mail messages with attachments.

However, the system doesn't make full use of the operating system's

capabilities. For example, Intraspect doesn't leverage Windows NT security, user and group definitions, or administration utilities.

Intraspect has a role-based security model that has been designed for collaborative use. Any object, from cabinets and folders to individual documents, can be restricted. Users and groups can be assigned to reader, contributor, organizer, editor, and publisher roles. This lets an organization create a variety of sharing environments in the group memory, from strict propose-review-publish workflow to a collaborative work area, giving members of a group free access to each other's work. Anonymous (unauthenticated) Web access can also be turned on for any subset of objects in the system.

Intraspect has tight integration with HTTP and the Simple Mail Transfer Protocol. Intraspect exposes SMTP, Java, and HTML-level application programming interfaces for integration with E-mail systems and custom client development. The HTML API provides several prebuilt templates for rapid customization.

Intraspect is designed for wide participation in an organization, and any user can contribute information to the group memory. Users can create folder hierarchies that make sense to them, then add to the group memory by dragging and dropping files from the Windows Explorer and URLs from a Web browser, or using a browser-based HTML form. Users can also "mail in" documents to a personal "collection bin" or directly to a folder. Users gathering information without knowing where it should go can contribute to their collection bin and move it into the appropriate folder later. This translates into more thorough collection and more accurate filing, both of which advance the cause of knowledge management.

Once documents are added to the group memory, users can automatically be notified of the update, either through E-mail or Intraspect's personalized Web interface.

A simple document upload template lets users profile information when adding it to the group memory. The template automatically captures the author's name and the date the document was created, and lets users add a title and description of the new document. If the document is modified, the system tracks the name of the user who modified it and the date that it was modified. You can use HTML to modify templates, adding more fields or changing the look and feel of the interface itself. Fields added to the metadata of the document are saved in the repository and are searchable using the built-in description parameter.

A very important feature: A single file in the group memory can exist in multiple contexts. When users select the page, they can see the multiple contexts in which it has been used, which may be helpful for additional information about the subject and to understand better who in an organization knows about the subject and in what ways.

Intraspect's user-control level is extremely powerful and will work for companies in which users are sufficiently disciplined to provide logical structure to their hierarchies. However, companies that have ad hoc managers run the risk of ending up with a highly unorganized and chaotic containment model. For them, Intraspect recommends using the access-control capabilities to give control over the top of the hierarchy to information specialists who focus on organizing the information and creating semi-private workspaces for collaboration.

Features that continue to distinguish Intraspect from most other knowledge-management tools are its collaborative features and E-mail integration. Intraspect lets users create and participate in multithreaded discussions within a hierarchy. Discussion items are saved in the system in context. Users can create distribution lists for documents and discussions by selecting the user's E-mail address. In addition, users can create annotations over the Web.

Collaboration can even include people outside the organization. Since each folder has its own unique E-mail address, outside users with rights can send messages directly into Intraspect. This feature is highly valuable for extranet applications in which organizations want to capture messages from customers or suppliers.

Livelink 8.0

Open Text focuses on providing products for businesses and government offices that want to use intranets and extranets for collaborative processes. Livelink is Open Text's flagship Web product; it includes document management, knowledge management, and workflow out of the box. Open Text sells Livelink directly and through channel partners.

Open Text positions Livelink as a collaborative, enterprisewide knowledge- and document-management product for managing information, resources, processes, and time.

Currently, Open Text partners with Kofax Image Products Inc. and Input Software Inc. to offer Kofax's Ascent Capture or Input Accel as a separate, integrated module for converting paper documents to TIFF graphic images. For managing time, Livelink offers OnTime, the descendant of the first scheduler built for Microsoft Windows. The most recent version is available as a fully integrated Livelink module , offering synchronization of its enterprise calendar with PalmPilot, Windows CE, Microsoft Exchange, Lotus Organizer, Outlook 97/98, Sidekick, Act, and Lotus Notes.

Livelink offers a set of core services, including a document-management repository (for information contribution), workflow (for managing process collaboration), virtual team collaboration (for project teams), and full-text search and retrieval. It also offers several configurable modules, including Livelink Spider (for indexing external Web pages and providing "push" updates), Livelink Forms (for gathering user input and routing form data through workflows), Livelink Desktop Activator (for Open Document Management API support), Livelink Activators for SAP R/3 and Lotus Notes (for providing access to other enterprise systems), Livelink Change Agents (for centralized management of Web-site changes and notification via E-mail), and Livelink Prospectors (for creating personalized virtual research assistants).

Livelink furnishes several searching protocols, including Boolean, proximity, thesaurus, soundex (provides a list of words that sound like the words in the query), stemming, and date range. Conceptual searching is not supported, however.

Overall, Livelink is the most complete product we have seen in the constellation of knowledge-management offerings. Moreover, development efforts are under way to enhance its existing capabilities.

There is a serious downside, however. Many users will find the user interfaces confusing and difficult to understand and navigate. The natural tendency for more compound products to be more difficult to learn holds here. The different functions, while well-developed, operate inconsistently and give this powerful product a "cobbled together" feel.

Livelink features one immensely practical innovation-it divides the user interface into three consoles, each with its own special view that corresponds very similarly to the way knowledge workers' daily tasks fall out. One view is for the enterprise and delivers "big picture" information everyone in the organization needs to see. The second interface is the project view, in which users spend time working on designated projects. With the appropriate permissions, a user can set up a project, designate its members' roles and responsibilities, build a workflow, and incorporate discussion groups. The third interface is the personal view, used for noncollaborative projects and tasks. All the functions of the project view are available in the personal view.

This three-level model works well for user productivity, keeping focus on one area at a time. If areas are blended, as with most products, many employees dissipate work energy shifting from one to the other. All-in-one consoles make for good marketing, but they undermine employee effectiveness.

Users can search and retrieve office documents, discussions, workflows, tasks, and projects. Search protocols provide a variety of methods for conducting a search. Users can also combine attribute- based searching with full-text content. Livelink uses its own full- text search engine. All results are user-configurable and include relevancy ranking and auto summarization.

Livelink uses a Web spider to index designated Web sites automatically and push updates to the subscribed user for immediate notification of changes to content. Users can receive notification through Livelink natively or through a MAPI-compliant E-mail system. Information retrieval also furnishes a variety of reports that can be presented in text, graphs, or tables. Only users with the appropriate permissions can view these reports.

Livelink's Knowledge Library goes far beyond traditional document management, providing support for virtually any file type, as well as on-the-fly conversion to HTML for viewing, version control, and compound document support. In addition, the Knowledge Library is completely object-based. Nine levels of permissions exist on each object, with full audit trails for all document categories and attributes.

Virtual Team Collaboration lets a project owner define the project overview, project outline, roles of each member of the virtual team, task lists, threaded discussion, news channels, and change agents. For more complex projects, the project owner can even create subprojects as a means of more granular control.

Livelink supplies workflow based on Java, with drag-and-drop workflow definition maps, over the Web. Livelink's workflow features include subflows; dynamic routing; conditional, parallel, or serial routing; and rules-based triggers, such as milestones, loop-backs, and permissions. Livelink integrates with Adobe Systems' intelligent forms to assist in the routing process as well.

When retrieving documents, the user has the option to view the document in HTML or its native format. When viewing the document in its native format, the user must have the native application resident on the workstation. Unfortunately, Livelink doesn't support the use of annotations.

Livelink lets users search across multiple databases simultaneously and retrieve a single, unified hit list. Users, therefore, don't need to know where information is located, making the search experience less stressful. In addition, the user can control the look and feel of search results. They may opt for automatic summarization, relevancy ranking, or a simple hit list for display search results.

Livelink's drag-and-drop capabilities are impressive. A user can add documents to the Livelink Knowledge Library by opening Windows Explorer and dragging the document or documents to the Livelink Explorer. This feature is ideal for users comfortable working in a tree-view environment.

ODMA support lets users add documents to the Knowledge Library directly from Microsoft Word by selecting "File/Save As." The Livelink profile screen automatically opens for indexing to the Knowledge Library.

Unfortunately, profiling E-mail messages into the Knowledge Library is a manual process. We were also disappointed that only one person and/or group can be assigned to a workflow task. The capabilities and graphical design of the workflow map is impressive, including map version control over the Web, and the ability to create reusable master workflow templates and to archive documents and their workflow instance upon completion of the workflow. But reusing these master templates is not an intuitive process.

The program doesn't highlight the hit results for full-text searches in the viewed document, making navigation laborious, especially in longer documents. The company says it's addressing this problem in the next release, Livelink 8.1.1. Finally, while Livelink offers more features and capabilities than similar products, the overall layout and presentation is inconsistent from one page to the next. Simplifying user interfaces and making each page both consistent and similar to a typical Web-page layout would greatly increase Livelink's ease of use.

Open Text's offering is stunning in its integration with workflow and document management, but it requires serious user-interface work.

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14/7/74 (Item 6 from file: 647)
DIALOG(R)File 647:CMP Computer Fulltext

01183493 CMP ACCESSION NUMBER: NWC19990125S0009
The Power of Knowledge and Information (Net Results)
Dave Molta

NETWORK COMPUTING, 1999, n 1002, PG23
PUBLICATION DATE: 990125
JOURNAL CODE: NWC LANGUAGE: English
SECTION HEADING: Columnists
TEXT:

When a congressman blatantly ignores the public interest and votes for legislation that benefits a major campaign contributor, we often deem it business as usual. When a corporate executive makes decisions based on the short-term value of his stock options rather than the long-term financial interests of the business, we shake our heads and conclude that it's just human nature. But when an IT manager lobbies for more resources, nurturing organizational alliances and making deals to garner support, we don't quite know what to make of it. After all, maneuvering of this type could diminish the probability that IT decisions will be made rationally, based on a thorough assessment of costs and benefits.

While cost/benefit analysis may make textbook sense as a principle guiding decision-making, it is woefully inadequate in explaining the way modern organizations operate. Increasingly, the IT decisions made by managers are influenced by non-technical factors in an environment where managers at all levels are struggling to effectively leverage PCs and other equipment that allow market leaders to make information a strategic asset. Information technology is the top issue on senior management's agenda. And most senior managers have become believers: It's impossible to be successful if your IT infrastructure is in ruins.

Meanwhile, engineers and programmers frequently appear oblivious to the strategic issues that keep senior management awake at night. After all, they're busy enough trying to find the best way to push those bits down the wire a little faster. To borrow from popular psychology, we might say that senior management is from Mars while the IT organization is from Venus. It's time for IT managers, and network managers in particular, to recognize that success is not always the by-product of being right. Information management has become the most politicized issue of the modern organization, and to be successful themselves, the techies need to get in the game.

Politics Isn't Always a Dirty Word Mention the word politics to a typical network engineer or systems administrator and you'll evoke the same response you'd get if you dragged your fingernails across a blackboard. While that view of the world is understandable, it's founded on a biased perspective on politics' role, broadly defined, within organizations.

Senators, governors and mayors are paid to make decisions about allocating resources-dividing up the public pie, so to speak. Sometimes, issues lend themselves well to decisions based on thoughtful analysis, and this fosters rational decisions that any well -informed person could support. More often than not, however, decision -makers base their choices on incomplete information and the desire to serve multiple interests. Occasionally, they serve their own interests-a strategy most of us would regard as lacking in principle. Other times, it's not crystal clear which interests are being served because the cause-and-effect relationship between decision and outcome is complex.

The allocation of resources within an organization is its politics. At any given moment, we can take a snapshot of how resources are

distributed and identify a power structure that both drives, and benefits from, that distribution. But the power structure in organizations is often fluid, influenced both by market variables and internal processes. Increasingly, information is an asset that threatens the status quo power structure. Information can transform the organization, leaving in its wake a group of once-powerful managers who resisted adoption of modern technologies.

IT managers are finding themselves in the midst of this tumult. If passive, they are seldom well-regarded either within or outside the IT organization. That's because of a powerful, if not altogether rational, belief that you can't get ahead making conservative IT decisions. But if IT managers are too aggressive in advocating a particular direction, they risk disaster if things don't pan out. IT managers, like casino gamblers, often need a little luck.

The Assertive Senior Management Team With big money on the IT table , it should come as no surprise that the senior management team, maybe even the chief executive, has taken a keen interest in all this IT wizardry. The middle-class knowledge elite are implementing LANs to interconnect their home PCs, and television commercials brainwash us into believing that the Internet and e-commerce will revolutionize our economy. The scary part is that it's probably true. The odds are high , and getting higher every day, that at least one or two of the managers on the executive team have become technology junkies, installing the latest Windows NT service pack and reading The Wall Street Journal while waiting for setup to run its course.

Is this a good thing or a bad thing for IT managers? Well, it's good to the extent that you may feel less pressure to dumb-down a technical explanation of why some new or exotic technology isn't ready for prime time. The IT vocabulary that managers used to leave at the office when they presented to senior management is becoming a more accessible element of our lexicon. And it may help you get enough of a budget boost to keep your best people without the need to resort to Y2K fear-mongering. But it spells trouble because it increases the likelihood of conflict over strategic IT directions.

Now, you have senior management interested in IT. You also have technical staff who advocate differing directions, partly because they're self-confident, partly because their increasingly specialized IT skills can make them indispensable or redundant-depending on which road you take. And of course, you have all the department and division managers, often with their own technical experts (the ones who install their NT service packs for them), busily optimizing internal systems to meet their own distributed needs. And they aren't overly concerned that this procedure doesn't follow organizational standards.

The IT Manager Merry-Go-Round It isn't easy for IT managers to survive in such an ambiguous environment, particularly when technology companies are making a nasty habit of meeting delivery targets with shoddy hardware and software, or worse yet, not meeting them at all. Even if a tenuous organizational consensus can be assembled, will the underlying technology work as advertised? Based on my experience, I'd say it probably won't, at least not within the time frame originally envisioned.

Good IT managers burn out quickly in these circumstances, but with today's shortage of people who have both technology and management skills,

the good news is that the free-agent market is booming. The organizational politics associated with reconciling intra- or inter- team conflicts can be debilitating to the best of them. And when senior management intervenes to demonstrate leadership, it's often in the form of technology strategies that may be long on practical business skills but short on technical common sense. Forced migrations to NT are perhaps the decade's freshest examples.

But so what if senior management drives out the best and brightest among the IT elite by setting bad direction and policy? Such a situation is custom-made for an outsourcing deal, usually the kind that's slanted toward the outsourcer, who must author a reasonable balance sheet while maintaining overhead much higher than that of an in-house organization.

Is There Any Hope? Some days, I wonder if there is a way out of this mess. It's easy to lose hope. But then I observe the positive transformations that so many organizations have made through smart IT adoptions. These implementations may not have been efficiently managed , and some problems may have to be worked out, but IT's forward momentum is apparent for several reasons.

First, organizations able to find and retain good management have become more efficient or have dramatically enhanced their market position through the strategic adoption of technology. More often than not, this is the result of a visionary who refuses to succumb to failure. Good economic times have enabled many organizations to pay high salaries, often above market, and money is a talent magnet. The trend in this regard grows as the financial allure of a career in IT has begun counteracting the perception that it's a field for geeks with pocket protectors.

Second, the legacy operation is often so abysmal that even the most basic technology upgrades can have a significant favorable impact. Imagine a return to typewritten manuscripts, clackety old cash registers, ATM-less shopping plazas, and no Internet. In this respect, the investments in IT have clearly paid off, even when they are not necessarily leading-edge.

Perhaps most important, there is evidence that the IT field is maturing, and that traditional battle lines are eroding. Mainframe and client/server experts are now meeting and engaging in constructive dialogue, each one fairly knowledgeable of the other's responsibilities and the appeal of their favored systems. Battles about the best network protocol or processor design are now assuming a more pragmatic bent. Relinquishing past hostilities, many experienced IT staff increasingly welcome the views of consultants, recognizing that the view of an outside expert can often lead to common ground, albeit at a fairly high price. And as senior management gains a greater comfort level in dealing with information-oriented issues, a more realistic view of the costs and benefits will emerge.

Send your comments on this column to Dave Molta at dmolta@nwc.com.

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EIS Powers Executives - America's corporate top brass is flocking to Ann Arbor to see if Comshare's system lives up to its reputation
Will McClatchy, Ann Arbor
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Every software vendor tries to sell high up in customer organizations, but Comshare takes this concept to extremes. The president and founder of the leading executive information systems (EIS) vendor spends much of his day selling systems to top executives.

"At first we were amazed when we learned there were seven executives on a jet coming out to Ann Arbor," says Richard Crandall, president of Comshare and a fixture in the computer field for more than two decades. The amazement soon subsided as Learjet after Learjet landed at the Ann Arbor, Mich., municipal airport to view demonstrations of Commander EIS, the firm's mainframe and PC system introduced in 1985 for bringing executives into the electronic age.

The steady flow of visitors has helped propel Comshare, founded by 46-year-old Crandall and several other University of Michigan graduates in 1966 as a timesharing service center, to the top of the $30 million to $40 million EIS business with 49.3% of the market in 1988, according to a recent study by the Gartner Group in Stamford, Conn. Although Comshare earned most of its $88 million in revenue for the fiscal year ended in June 1989 from its timeshare and decision support businesses, Framingham, Mass.-based International Data Corp. expects Comshare to profit from an explosive growth in the EIS market, which should top $200 million in total revenue in two years.

Not that the company is without competition. Pilot Executive Software of Boston is considered a strong contender, with 26.7% of the market, according to the Gartner Group. And relative newcomers Execucom Systems Corp. of Austin, Texas, and Information Resources Inc. of Waltham, Mass., are making concerted efforts to corner the market. Even IBM is jumping into the act this month with its first EIS product, Executive Decisions.

Overcoming MIS Fears

"With EIS, early on it became very necessary to be one on one with a sponsoring executive because half the conversation has nothing to do with the product," Crandall says as he reads Commander-generated memos from a large touch-screen monitor encased in an oak cabinet, the only high-tech fixture in his spacious office. "They ask, `Will this fit with our corporate culture?' and need to overcome fears and biases."

In addition to courting CEOs, Comshare is pursuing the support of IS management. The company initially sold exclusively to senior management but realized that IS acceptance is critical to EIS's success.

Crandall admits that selling the IS director on EIS has not always been as easy as convincing the CEO. "In approximately half the cases, the key IS chief or CIO is somewhere in the path of moving toward strategic systems or of blending technology with a corporate strategic plan," allowing ambitious projects to get off the ground quickly. But , he adds, "there is the other half-and it was fully half the last time I looked-that believe their executives wouldn't go for it or feel that this is just one more Trojan horse for uncontrolled end-user computing. In some cases it goes in anyway, and then these become difficult customer relationships to manage.

"The concern is that IS will pick up a lot of additional responsibilities in reporting that it didn't have before, in timeframes

that are very unrealistic," admits Crandall. "We are not just talking about end-user business professionals that may have demands but no power. We are talking about people who have demands, timeframes, and lots of power. That's a frightening situation if you are not convinced that you have the toolset that allows you to deliver the applications in time."

To assuage those concerns about the system, which sells for $300,000 to $500,000, Comshare has spent the past four years enhancing Commander's toolset. Among the latest development efforts is a Macintosh version due in the fourth quarter of this year, a Presentation Manager version expected around year end, and a joint project currently under way with Dow Jones & Co. to provide easy access to public access databases.

Gary Gulden, senior VP of Cambridge, Mass.-based Index Group, says of Comshare: "They are very heads-up players, and they look outside their firm for opportunities. They have a large R&D commitment, and that commitment finds its expression not just in their own products but also in connections with other products."

Comshare, in fact, recently laid out a five-year plan in which it will support Digital Equipment Corp.'s VAX environment and Apple products. "Our belief is that customers are increasingly looking for choice in their strategic selections of hardware, software, and telecommunications," says Crandall. "They want to minimize the vendors they deal with. They want flexibility, and they want to avoid being locked in to super proprietary applications. . .We have modified our strategic plan and have been heavily influenced by customer demand to support a broader set of platforms than IBM."

Crandall emphasizes, "It is in Comshare's strategic plan to be complimentary to the IBM environment," and Commander is compliant with OS/2 and SAA. But as for other platforms, he says: "We had a lot of management divisiveness about who we should support. There was strong advocacy for Unix and Apple.

"We've been very impressed with the genuine incursion of Apple into the IBM customer set. We've had customers like E.I.! Du Pont de Nemours & Co.!, which are very key IBM accounts, press us to the wall to support Macintosh for Commander. I've never received the kind of correspondence from as high a level-CFOs and CIOs-on any subject than I have on Commander supporting Apple."

The Pilgrimage To Ann Arbor

The Du Pont executives made the pilgrimage to Ann Arbor in 1988 and generally liked what they saw. "It was extremely refreshing, because these were people who understood the market we were dealing with and not just the technology," says Tom Holmes, product manager of EIS and a member of Du Pont's EIS steering committee. "They help you understand your internal marketplace, as it were, which are the executives."

Like most managers who develop and oversee EIS, Holmes is a hybrid IS/business manager. Though he has many years of marketing and business experience, he reports to Du Pont's VP of information technologies, Raymond Cairns. Du Pont executives have used decision support systems for more than six years, but when then-vice chairman Edgar Woolard Jr. (now chairman and CEO) asked to explore EIS, Cairns says, a steering committee of members from several departments was organized.

Cairns says a major requirement was for the system to tap into the existing flow of data such as Profs messages on the corporation's IBM mainframe and All-in-1 documents on its VAXes. "I can get directly into All-in-1 from Commander," he says.

"We tried to find a package that required an absolute minimum of work," he adds. With only a half dozen people working on the system, " we feel we have met that goal." Furthermore, most of this staff is continually enhancing the system. "The system has to continually evolve,"

Cairns says. "It is never done, and that is what's so exciting about it."

The chemical and energy conglomerate currently disseminates data on market trends, competitive analysis, human resource activity, and financial results, which more than 100 executives in the United States , Switzerland, and the Far East can download, analyze, and redistribute. Says EIS manager Holmes, "We expect to expand our current applications to a couple of hundred executives and penetrate Latin America, as well as Canada, the rest of Europe, and more of the Far East."

Currently, 10% of Comshare's business comes from the Pacific Rim, where developmental efforts are under way to support Fujitsu, and the balance is about equally divided between Europe and North America. Crandall notes that 30% of Comshare's sales are in Europe, unusually large for an American company.

But before it can expand, Comshare's first order of business is to add more of the same type of marketing information now available, explains Holmes. "We probably need to increase the ability to dissect the information from a regional basis as well as a global basis," he says. "That will take work on our part to get the data correct."

A familiar refrain from companies such as EIS-savvy Du Pont is that the system is quickly spreading down into lower levels of management and into individual business groups. "We keep getting surprised at the applicability of these tools lower in the organization," he says. "At first we thought only 10 people at Du Pont would want the information , but we quickly saw this assumption fade away. Just because you are lower in the organization doesn't mean you don't want and need easy iconic access to information."

Crandall does not take much credit for the spread of EIS beyond the board room. "It's not something you have to tell anybody to make happen," he says. "It happens all by itself. When a manager is getting some information, the people who report to him want to get that information-and in more detail and sooner."

Du Pont's Holmes says he values Comshare's policy of listening carefully to customer requests. "We like to establish good partnership relationships with our key vendors," he says. "We like to influence their development. They in turn get to do more business with Du Pont."

IS director Cairns says EIS changes some-but not all-the ways Du Pont does business. "When trying to be a truly global company, it's very important that information is available simultaneously in the U.S., the Far East, and South America and Europe," he says. "By being consistent, it has influenced the decision-making process." At the same time, "we wanted to present information that was consistent with how the company operates," he says. "We didn't want to give people access to information prior to their subordinates. That way it becomes a non-threatening system."

High Risk, High Reward

The efforts of Comshare and its competitors to improve their products seem to be slowly winning over IS managers, say observers. " In the past, it was senior executives who were the strong advocates for EIS. And while that is still very important in many organizations, MIS is now taking a proactive stand in terms of encouraging management to consider EIS," says Hugh Watson, director of MIS programs at the University of Georgia in Athens. "I think EIS will be increasingly important and common. A failure of MIS to get involved in it now will be a greatly missed opportunity."

But at the same time, EIS has to date been a fairly risky proposition, Watson warns. A study he conducted this year for the University of Georgia's Executive 2000 center for research into executive activity contacted 50 firms with EIS projects and found 20 that had failed. Watson says his staff is now taking a closer look at why these

failures occurred.

Despite the risks, EIS is an easy way for IS managers to demand attention. "EIS offers one of two approaches currently available for MIS to have high visibility in the firms," Watson adds. "The other one , of course, is to use information technology for competitive advantage."

Jack Rockart, director of the Center for Information Systems Research at the Massachusetts Institute of Technology's Sloan School of Management and co-author of Executive Support Systems, says the broad experience of those being put in charge of large EIS systems is a positive sign. "In the most significant systems we see, the person who tends to be running these things as the operational sponsor is someone with different types of knowledge of the company," he says. And, of course, "they are selected for their ability to communicate with senior executives."

In addition, he says, finance and administrative personnel are coming to better terms with IS. "There is a clear emphasis on working with the data suppliers," he says.

Rockart also sees a subtle shift in the profile of today's CEO or CFO that has heightened the importance of EIS. "There is a rising tide of senior executives who realize they cannot be hands-off," because of tougher global competition and shrinking middle management, he says. "A number of companies are worried about coordinating their strategic business units. I believe we are seeing a number of senior executives who are not financial experts but operational experts and who really want to be on top of the business." EIS is one method of reaching that goal.

Tapping The Right Resources

While Comshare is branching out into new platforms such as the Macintosh, many observers credit its success with early and thorough support of true Blue architectures VM and MVS. "What Comshare has done is to target the information to the IBM environment, which is where most corporate data is stored," says Larry Runge, program manager with GE Capital's Fleet Services, who previously managed EIS environments at GE Capital's aeronautics business. At GE Capital, strategic mainframe information is generally stored in applications such as Profs, DB2, and Comshare's System W decision support package.

Fleet Services' general manager is expected to use a Commander- based system currently in prototype, to track more than 400,000 leased trucks and vehicles in order to gather and analyze financial and marketing information. Runge's system presents frequently updated spreadsheets of Fleet data, with problem areas automatically highlighted in red, causes for concern in yellow, and strong performance figures in green. The system reduces the time it takes for a report to reach an executive and for that executive to analyze and respond to it.

"Exception reporting really isn't practical without some automated tool because you end up sifting through reams of data to identify problems," he says. And whereas, "in the past, middle management would prepare reports for delivery to upper management, which takes time, now the executive has access to the latest numbers just as soon as they are entered into the mainframe."

One gap in the Comshare product line is the lack of a Unix version of Commander. But Mary Danforth, VP of product development, says requests for it have thus far come only from a handful of government and European clients. "There are problems with Unix being the business base," she says, citing security. Crandall says Comshare is not supporting Unix because, in his view, "the numbers aren't there." Still, Danforth says Unix is one of the next ports under consideration at Comshare. "We see the AS/400 and Unix as being where we may move to," she says.

In addition to diligently supporting IBM architectures, Comshare struck an agreement with IBM in 1988 for the two sales forces to combine

efforts on certain accounts. Crandall says this has been beneficial but nonetheless involved a choice between short-term profit margins and long-term market penetration. "Sometimes we have a little difficulty from an economic standpoint because our sales force will work as hard on an IBM deal as they will work without IBM's help," he says, "and the theory is that there should be greater productivity. Still, the opportunities to reach more clients through the partnership offsets this."

Comshare also struck up a value-added reseller relationship this January with Atlanta-based Management Science America, which sells a $50,000 entry-level version of Commander that runs with MSA's own Brightview PC-based graphical front-end for mainframes. Norman Neuman Jr., Comshare's VP of U.S. marketing, says MSA's broad applications support experience allows the product to tackle more traditional operational projects tailored to specific industries. "What they give us as a VAR is the client relationships and more sales people," he says.

Instant Response

Hertz Corp. is one Comshare client that has benefited from EIS's speed of response, an essential tool in the highly competitive and variable rental car business. "This is the example of a competitive market in the capitalist system if there ever was one," says William Carroll, VP of marketing planning for Hertz. He adds that EIS "allows our senior managers to integrate a great many complicated decisions systematically," such as location and pricing of cars. "It allows you to understand much better the impact of market segmentation on your business," he says.

Traditional reporting systems can assemble transactions into a few standard aggregates for a crude look at overall rental activity, but EIS is far better at probing business within regions and at performing "what-if" scenarios based on many different elements, such as seasonal variation, the mix of different types of business, and economic factors. "The users are capable of re-aggregating the information in a variety of ways that allow them to come to conclusions, develop strategies, and exploit opportunities," he says. Exactly what executives learn about the market "is something we prefer not to describe in detail for competitive reasons," Carroll says.

To keep overhead to a minimum, commonly used reports are created and stored at the mainframe, ready for distribution. For processing reports on a specific subject, Hertz executives simply request chunks of raw data from the mainframe for local charting and "what-if" analysis in Commander's built-in spreadsheet or in a third-party application such as a statistical analysis package.

The Fuzzy Economics Of EIS

While at Hertz the sheer necessity of staying up to date on marketing information points up the worth of the company's EIS, calculating the cost effectiveness of such a system with precision can be elusive. Says GE Capital's Runge: "It's hard to quantify how EIS is contributing to executive decisions. It's probably just as difficult to quantify how executives arrive at decisions."

Lynda Applegate, an assistant professor of business administration for Harvard Business School who has studied and advised companies about EIS, cites as an exception one company that was able to cut inventory as a result of having more timely information through EIS. The capital freed up by the reduced inventory was easily quantified and came to more than the EIS investment.

In most cases, managers must look for EIS's broad effect on the way their company does business. Adds Applegate, "You see the dollar benefits when you can change your business strategy."

That may seem like a subjective reason for plunking down nearly half a million dollars for an EIS system, but Comshare watchers say it should

be enough to keep the company racing forward. Says Bill McNee, analyst at the Gartner Group: "I am very high on the company. They are well positioned for the future."

Hot Competition For Control Of EIS Market

Comshare may be doing well in the EIS market, observers agree, but its hold on the top spot is hotly contested by the other major presence in the field, Pilot Executive Software of Boston.

Pilot, which makes Command Center EIS, stepped up the rivalry recently with an advertisement that states: "Real leadership is not won by words or claims. It's built on references. Real corporations using real systems. Ask for our complete user list. Then ask Comshare for their list of `10,000 EIS users.' "

International Data Corp. of Framingham, Mass., estimated Comshare's 1987 share of the EIS software market at 52%, while it pegged Pilot's at 36%. Meanwhile, Boston-based Gartner Group's market share figures show Comshare climbing from 46% to 49% between 1987 and 1988 and Pilot edging down from 32% in 1987 to 26% in 1988. David Friend, who founded Pilot in 1983 and serves as president, disputes these figures, saying they are poorly substantiated.

No one disputes that Pilot is fighting back with product improvements, though. This summer the company delivered an MVS version of Command Center, which is considered critical for breaking into the larger Big Blue shops, and last month it added Executive Mail, an E- Mail package based on easy-to-use icons and menus with interfaces to Profs and All-in-1.

Pilot also announced the fourth-quarter release of IMpact, a software package for issues management, or the handling of high- priority projects. Finally, the company demonstrated a Macintosh version of Command Center's front end, due out in the second quarter of next year. Other projects in Pilot's ambitious development schedule for 1990 include a back-end version for Unix hosts and a front-end one for OS/2 with Presentation Manager.

Clare Gillan, senior analyst at IDC, stands by her company's study but notes that claims of revenue leadership by one company and user base leadership by another need not be contradictory. Comshare's policy of charging a company for each workstation user, she says, seems to have contributed to its bottom line, while Pilot's policy of granting comprehensive site licenses appears to have encouraged corporations to spread that company's software throughout the corporation.

Observers agree that both firms are far ahead of all others, not only in market share but also in the variety of functionality and breadth of platforms supported. Says Gillan, "Both have been in the market for a number of years, and both contributed to educating the market, and both are investing a lot of development effort."

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Please see HELP NEWS481 for more information.
File 485:Accounting and Tax Database 1971-1999/Nov W2
(c) 1999 Bell & Howell
*File 485: The database will not be updated until April, 2000
due to changes and enhancements by Bell & Howell.
File 583:Gale Group Globalbase(TM) 1986-2000/Feb 29
(c) 2000 The Gale Group
File 609:Bridge World Markets News 1989-1999/Dec 31
(c) 1999 Bridge
*File 609: File 609 will not be updated until further notice
due to some upcoming file changes and enhancements.
File 621:Gale Group New Prod.Annou.(R) 1985-2000/Feb 29
(c) 2000 The Gale Group
File 623:Business Week 1985-2000/Feb W3

(c) 2000 The McGraw-Hill Companies Inc
File 624:McGraw-Hill Publications 1985-2000/Feb 29
(c) 2000 McGraw-Hill Co. Inc
File 625:American Banker Publications 1981-2000/Feb 29
(c) 2000 American Banker
File 626:Bond Buyer Full Text 1981-2000/Feb 29
(c) 2000 Bond Buyer
File 635:Business Dateline(R) 1985-1999/Nov 17
(c) 1999 Bell & Howell
*File 635: Updating is expected soon beginning with Nov. 1999 updates and proceeding forward. The file should be current within 7-10 days.
File 636:Gale Group Newsletter DB(TM) 1987-2000/Feb 29
(c) 2000 The Gale Group
File 790:Tax Notes Today 1986-2000/Feb 25
(c) 2000 Tax Analysts
File 791:State Tax Today 1991-2000/Feb 25
(c) 2000 Tax Analysts
File 792:Worldwide Tax Daily 1987-2000/Feb 25
(c) 2000 Tax Analysts

Set Items Description
--- ----- ----------
?s (bayesian or belief) (5N) network?
Processing
Processed 10 of 26 files ...
Completed processing all files
3871 BAYESIAN
261578 BELIEF
4441236 NETWORK?
S1 1187 (BAYESIAN OR BELIEF) (5N) NETWORK?
?s s1 and risk and derivative?
1187 S1
1864583 RISK
229427 DERIVATIVE?
S2 2 S1 AND RISK AND DERIVATIVE?
?t s2/6/1-2

2/6/1 (Item 1 from file: 15)
00915729 95-65121
USE FORMAT 9 FOR FULL TEXT
Social information processing and social networks: A test of social influence mechanisms
Sep 1994 LENGTH: 35 Pages
WORD COUNT: 13564

2/6/2 (Item 2 from file: 15)
00835943 94-85335
USE FORMAT 9 FOR FULL TEXT
Economic institutions and the satisfaction of human needs
Mar 1994 LENGTH: 42 Pages
WORD COUNT: 13991
?s s2 and risk and caus?
2 S2
1864583 RISK
2670642 CAUS?
S3 2 S2 AND RISK AND CAUS?
?s s3 not s2

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          2 S3
          2 S2
    S4     0 S3 NOT S2
?ds

Set     Items   Description
S1       1187   (BAYESIAN OR BELIEF) (5N) NETWORK?
S2          2   S1 AND RISK AND DERIVATIVE?
S3          2   S2 AND RISK AND CAUS?
S4          0   S3 NOT S2
?s s1 and risk
         1187 S1
      1864583 RISK
    S5    203 S1 AND RISK
?s s5 and ((errors or fault? or integrity) (5N) data)
Processed  10 of  26 files ...
Processing
Completed processing all files
          203 S5
       235784 ERRORS
       282842 FAULT?
       247715 INTEGRITY
      6312183 DATA
        51389 ((ERRORS OR FAULT?) OR INTEGRITY)(5N)DATA
    S6      2 S5 AND ((ERRORS OR FAULT? OR INTEGRITY) (5N) DATA)
?s s6 not s3
          2 S6
          2 S3
    S7      2 S6 NOT S3
?t  s6/6/1-2

 6/6/1     (Item 1 from file: 148)
04844980     SUPPLIER NUMBER: 08926176    (USE FORMAT 7 OR 9 FOR FULL TEXT)
Dangerous liaisons. (plant-wide information processing)
August, 1990
WORD COUNT:  3020   LINE COUNT:  00253


 6/6/2     (Item 1 from file: 609)
2878006              13433
QUAKE HAZARD FOR PACIFIC NORTHWEST GREATER THAN PREVIOUSLY BELIEVED
DATE:         January      Fe 0 , 1995
?s s5 and financ?
Processing
Processing
Processed  10 of  26 files ...
Processing
Processed  20 of  26 files ...
Completed processing all files
          203 S5
     11224734 FINANC?
    S8    103 S5 AND FINANC?
?rd
>>>Duplicate detection is not supported for File 481.
>>>Duplicate detection is not supported for File 623.
>>>Duplicate detection is not supported for File 625.
>>>Duplicate detection is not supported for File 626.
>>>Duplicate detection is not supported for File 790.
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>>>Duplicate detection is not supported for File 791.
>>>Duplicate detection is not supported for File 792.

>>>Records from unsupported files will be retained in the RD set.
...examined 50 records (50)
>>>Record 623:376843 ignored; incomplete bibliographic data, not retained -
in RD set
...examined 50 records (100)
...completed examining records
S9 65 RD (unique items)
?t s9/6/1-65

9/6/1 (Item 1 from file: 9)
02588364 02138828 (USE FORMAT 7 OR 9 FOR FULLTEXT)
AMR and new business opportunities-not an oxymoron
September 1999
WORD COUNT: 2418

9/6/2 (Item 2 from file: 9)
02019993 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Approval or Not, PrimeStar's O'Brien Forges Ahead
December 08, 1997
WORD COUNT: 3772

9/6/3 (Item 3 from file: 9)
01917019 (USE FORMAT 7 OR 9 FOR FULLTEXT)
the Future is Now -- Leading-edge IT managers tap into vendor R&D efforts
August 25, 1997
WORD COUNT: 3177

9/6/4 (Item 4 from file: 9)
01810164 (USE FORMAT 7 OR 9 FOR FULLTEXT)
The Dawn Of Legal Networks
April 1997
WORD COUNT: 3270

9/6/5 (Item 5 from file: 9)
01309205 (USE FORMAT 7 OR 9 FOR FULLTEXT)
CUT LOOSE
October 15, 1995
WORD COUNT: 2188

9/6/6 (Item 6 from file: 9)
01240641 (USE FORMAT 7 OR 9 FOR FULLTEXT)
NO RUSH TO THE WEB
July 17, 1995
WORD COUNT: 826

9/6/7 (Item 1 from file: 15)
01963468 47012176
USE FORMAT 9 FOR FULL TEXT
Who is buying life insurance practices?

Dec 6, 1999 LENGTH: 4 Pages
WORD COUNT: 3093

9/6/8 (Item 2 from file: 15)
01906361 05-57353
USE FORMAT 9 FOR FULL TEXT
Knowledge creation and social networks in corporate entrepreneurship: The renewal of organizational capability
Spring 1999 LENGTH: 21 Pages
WORD COUNT: 10079

9/6/9 (Item 3 from file: 15)
01863212 05-14204
USE FORMAT 9 FOR FULL TEXT
Global e-commerce, local problems
Jul/Aug 1999 LENGTH: 7 Pages
WORD COUNT: 4460

9/6/10 (Item 4 from file: 15)
01807201 04-58192
USE FORMAT 9 FOR FULL TEXT
Can big blue master some new steps?
May 1999 LENGTH: 8 Pages
WORD COUNT: 5090

9/6/11 (Item 5 from file: 15)
01742607 03-93597
USE FORMAT 9 FOR FULL TEXT
Zions' young lion
Dec 1998 LENGTH: 5 Pages
WORD COUNT: 2285

9/6/12 (Item 6 from file: 15)
01720865 03-71855
USE FORMAT 9 FOR FULL TEXT
Levels of trust
Oct 1998 LENGTH: 2 Pages
WORD COUNT: 1394

9/6/13 (Item 7 from file: 15)
01701577 03-52567
USE FORMAT 9 FOR FULL TEXT
Labour, gender and the economic/social divide
1998 LENGTH: 14 Pages
WORD COUNT: 6405

9/6/14 (Item 8 from file: 15)
01699732 03-50722
USE FORMAT 9 FOR FULL TEXT
Networks within networks: Service link overlap, organizational cliques, and network effectiveness

Aug 1998 LENGTH: 11 Pages
WORD COUNT: 6362

9/6/15 (Item 9 from file: 15)
01546927 01-97915
USE FORMAT 9 FOR FULL TEXT
Up and coming carve outs
Nov/Dec 1997 LENGTH: 5 Pages
WORD COUNT: 2732

9/6/16 (Item 10 from file: 15)
01356480 00-07467
USE FORMAT 9 FOR FULL TEXT
Managing an interorganizational network: A framework of the institutional mechanism for network control
1996 LENGTH: 30 Pages
WORD COUNT: 12038

9/6/17 (Item 11 from file: 15)
01353375 00-04362
USE FORMAT 9 FOR FULL TEXT
Changes in the theory of interorganizational relations in marketing: Toward a network paradigm
Winter 1997 LENGTH: 16 Pages
WORD COUNT: 13842

9/6/18 (Item 12 from file: 15)
01237714 98-87109
USE FORMAT 9 FOR FULL TEXT
On the meaning of networks
Jun 1996 LENGTH: 20 Pages
WORD COUNT: 6317

9/6/19 (Item 13 from file: 15)
01231161 98-80556
USE FORMAT 9 FOR FULL TEXT
Mergers, networking, and vertical integration: Managed care and investor-owned hospitals
Winter 1996 LENGTH: 9 Pages
WORD COUNT: 6263

9/6/20 (Item 14 from file: 15)
01070889 97-20283
USE FORMAT 9 FOR FULL TEXT
The impact of explanation facilities on user acceptance of expert systems advice
Jun 1995 LENGTH: 16 Pages
WORD COUNT: 8879

9/6/21 (Item 15 from file: 15)
01022281 96-71674

USE FORMAT 9 FOR FULL TEXT
The new network firm: A spherical structure built on a human investment philosophy
Spring 1995 LENGTH: 15 Pages
WORD COUNT: 6181

9/6/22 (Item 16 from file: 15)
01012028 96-61421
USE FORMAT 9 FOR FULL TEXT
States now driving health care reform's future
Apr 3, 1995 LENGTH: 4 Pages
WORD COUNT: 2148

9/6/23 (Item 17 from file: 15)
00877328 95-26720
USE FORMAT 9 FOR FULL TEXT
Bid the branch good-bye
Jun 1994 LENGTH: 2 Pages
WORD COUNT: 648

9/6/24 (Item 18 from file: 15)
00869157 95-18549
USE FORMAT 9 FOR FULL TEXT
Automated dynamic audit programme tailoring: An expert system approach Discussion
1993 LENGTH: 21 Pages
WORD COUNT: 11515

9/6/25 (Item 19 from file: 15)
00869156 95-18548
USE FORMAT 9 FOR FULL TEXT
Aggregation of evidence in auditing: A likelihood perspective Discussion
1993 LENGTH: 36 Pages
WORD COUNT: 13320

9/6/26 (Item 20 from file: 15)
00821827 94-71219
USE FORMAT 9 FOR FULL TEXT
Managing Euregional networks
1993 LENGTH: 18 Pages
WORD COUNT: 7598

9/6/27 (Item 21 from file: 15)
00798336 94-47728
USE FORMAT 9 FOR FULL TEXT
The sociologist's approach to sustainable development
Dec 1993 LENGTH: 3 Pages
WORD COUNT: 2356

9/6/28 (Item 22 from file: 15)
00665472 93-14693

USE FORMAT 9 FOR FULL TEXT
Internationalisation in service companies
Jan 1993 LENGTH: 18 Pages
WORD COUNT: 6122

9/6/29 (Item 1 from file: 16)
06845157 Supplier Number: 57934288 (USE FORMAT 7 FOR FULLTEXT)
Citigroup Names Marge Magner to Oversee Primerica Financial Services and Citibanking, North America.
Dec 3, 1999
Word Count: 551

9/6/30 (Item 2 from file: 16)
06763346 Supplier Number: 56972424 (USE FORMAT 7 FOR FULLTEXT)
REPEAT/ CTC Communications Group Reports Record Revenue and Operating Results.
Oct 28, 1999
Word Count: 1500

9/6/31 (Item 3 from file: 16)
06574721 Supplier Number: 55497650 (USE FORMAT 7 FOR FULLTEXT)
IIJ Announces First Quarter Results for the Period Ended June 30, 1999.
August 18, 1999
Word Count: 2721

9/6/32 (Item 4 from file: 16)
06088378 Supplier Number: 53615195 (USE FORMAT 7 FOR FULLTEXT)
Micromuse Announces Record Results for First Quarter of Fiscal 1999.
Jan 21, 1999
Word Count: 1340

9/6/33 (Item 5 from file: 16)
05582708 Supplier Number: 48451673 (USE FORMAT 7 FOR FULLTEXT)
National Pork Producers Council (NPPC) Statement in Reaction to Latest Call by Iowa Citizens for Community Improvement for Immediate End to Pork Checkoff
April 28, 1998
Word Count: 4564

9/6/34 (Item 6 from file: 16)
05270331 Supplier Number: 48029692 (USE FORMAT 7 FOR FULLTEXT)
HBO & Company and HealthDesk Corporation Announce Exclusive Distribution Partnership for HealthDesk OnLine Products.
Oct 6, 1997
Word Count: 525

9/6/35 (Item 7 from file: 16)
04793088 Supplier Number: 47053648 (USE FORMAT 7 FOR FULLTEXT)
Base Ten Announces Fourth Quarter and Fiscal Year Results.
Jan 21, 1997
Word Count: 4208

9/6/36 (Item 8 from file: 16)
03818288 Supplier Number: 45450918 (USE FORMAT 7 FOR FULLTEXT)
States Now Driving Health Care Reform's Future
April 3, 1995
Word Count: 2131

9/6/37 (Item 9 from file: 16)
03725986 Supplier Number: 45282124 (USE FORMAT 7 FOR FULLTEXT)
America's Health: Anatomy Of An Aspiring Network
Jan 23, 1995
Word Count: 1003

9/6/38 (Item 10 from file: 16)
02902370 Supplier Number: 43917752 (USE FORMAT 7 FOR FULLTEXT)
FREDDIE MAC REINVENTS ITSELF IN MULTIFAMILY AREA
June 21, 1993
Word Count: 888

9/6/39 (Item 1 from file: 20)
07612119 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Hartford Life chooses StarNex' ConnectSMART Software; Insurer Aims for More Efficient Processing of Group Life and Disability Proposals
October 06, 1999
WORD COUNT: 582

9/6/40 (Item 2 from file: 20)
05903537 (USE FORMAT 7 OR 9 FOR FULLTEXT)
How To Develop The Best New Products
It starts with the Big Idea. Gets enriched by customer response. Gathers pace with design. Progresses to prototypes. And, ultimately, draws in the entire value chain. BT presents the benchmarks from India's product development wizards.
June 25, 1999
WORD COUNT: 5315

9/6/41 (Item 3 from file: 20)
01496907 (USE FORMAT 7 OR 9 FOR FULLTEXT)
National Pork Producers Council (NPPC) Statement in Reaction -2-
April 28, 1998
WORD COUNT: 1304

9/6/42 (Item 1 from file: 148)
11760609 SUPPLIER NUMBER: 57009797 (USE FORMAT 7 OR 9 FOR FULL TEXT)
AMR and new business opportunities - not an oxymoron.(automatic meter reading)
Sept, 1999
WORD COUNT: 2509 LINE COUNT: 00216

9/6/43 (Item 2 from file: 148)

10394621 SUPPLIER NUMBER: 20573320 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Understanding integrated rural health networks.
Winter, 1997
WORD COUNT: 8066 LINE COUNT: 00704

9/6/44 (Item 3 from file: 148)
10391985 SUPPLIER NUMBER: 20522683 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Transnational management influence over changing employment practice: a case from the food industry.
March, 1998
WORD COUNT: 9294 LINE COUNT: 00793

9/6/45 (Item 4 from file: 148)
09977705 SUPPLIER NUMBER: 20162004 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Approval or not, PrimeStar's O'Brien forges ahead. (interview with PrimeStar Partners LP president Daniel J. O'Brien)(Interview)
Dec 8, 1997
WORD COUNT: 3992 LINE COUNT: 00290

9/6/46 (Item 5 from file: 148)
09713114 SUPPLIER NUMBER: 19727055 (USE FORMAT 7 OR 9 FOR FULL TEXT)
The future is now. (private sector research and development efforts) (Research & Development) (Industry Trend or Event)(Cover Story)
August 25, 1997
WORD COUNT: 3439 LINE COUNT: 00286

9/6/47 (Item 6 from file: 148)
08901825 SUPPLIER NUMBER: 18561341
Efficiency and antitrust considerations in home banking: the proposed Microsoft-Intuit merger.(A Special Issue: Antitrust and Banking)
Summer, 1996
WORD COUNT: 6843 LINE COUNT: 00532

9/6/48 (Item 7 from file: 148)
08866083 SUPPLIER NUMBER: 18567768
Microcultural analysis of variation in sharing of causal reasoning about behavior.
March, 1996
WORD COUNT: 16155 LINE COUNT: 01379

9/6/49 (Item 8 from file: 148)
07665322 SUPPLIER NUMBER: 16491243 (USE FORMAT 7 OR 9 FOR FULL TEXT)
America's Health: anatomy of an aspiring network. (America's Health Network) (Company Profile)
Jan 23, 1995
WORD COUNT: 1073 LINE COUNT: 00081

9/6/50 (Item 9 from file: 148)
06518476 SUPPLIER NUMBER: 14377605 (USE FORMAT 7 OR 9 FOR FULL TEXT)
The Persean ethic: consistency of belief and action in managerial practice.
May, 1993

WORD COUNT: 18609 LINE COUNT: 01545

9/6/51 (Item 10 from file: 148)
06113749 SUPPLIER NUMBER: 12547286 (USE FORMAT 7 OR 9 FOR FULL TEXT)
VI. Possible futures for Silicon Valley. (Joint Venture: Silicon Valley)(An Economy at Risk: the Phase 1 Diagnostic Report)
August 17, 1992
WORD COUNT: 2378 LINE COUNT: 00200

9/6/52 (Item 11 from file: 148)
05454018 SUPPLIER NUMBER: 11290486 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Peer to peer. (American Society of Association Executives' 9th Management Conference)
Sept, 1991
WORD COUNT: 1548 LINE COUNT: 00124

9/6/53 (Item 12 from file: 148)
04844980 SUPPLIER NUMBER: 08926176 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Dangerous liaisons. (plant-wide information processing)
August, 1990
WORD COUNT: 3020 LINE COUNT: 00253

9/6/54 (Item 13 from file: 148)
04578125 SUPPLIER NUMBER: 08409594 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Reactions to the Federal High Performance Computing Program: a survey of issues.
Spring, 1990
WORD COUNT: 4154 LINE COUNT: 00359

9/6/55 (Item 14 from file: 148)
04076043 SUPPLIER NUMBER: 07838681 (USE FORMAT 7 OR 9 FOR FULL TEXT)
The view from the top. (At Large - David Salzman) (interview)
July 31, 1989
WORD COUNT: 5115 LINE COUNT: 00368

9/6/56 (Item 15 from file: 148)
02021484 SUPPLIER NUMBER: 03085706 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Entertainment. (Perspective 1984)
Jan 2, 1984
WORD COUNT: 2929 LINE COUNT: 00231

9/6/57 (Item 1 from file: 485)
00416179
** FULL-TEXT AVAILABLE IN FORMATS 7 AND 9 **
Freddie Mac reinvents itself in multifamily area WORD COUNT: 870
LINE COUNT: 79
Jun 21, 1993

9/6/58 (Item 1 from file: 609)
6998608 13187

FULL: CITIGROUP'S PLUMERI RESIGNS AS PRIMERICA FINCL SVCS HEAD
DATE: December 03, 1999

9/6/59 (Item 2 from file: 609)
3143431 5569
CHICAGO TRIBUNE MEDIA COLUMN
DATE: July 16, 1995

9/6/60 (Item 1 from file: 624)
00916207
PRODUCT INFORMATION GUIDE
February 1998
Word Count: 5,796 *Full text available in Formats 5, 7 and 9*

9/6/61 (Item 2 from file: 624)
0376843
WHY THE LOSING NETWORK IS STILL A WINNER: ABC may be No. 3 in the Nielsens, but it's No. 1 at the bank
April 20, 1992
Word Count: 1,157 *Full text available in Formats 5, 7 and 9*

9/6/62 (Item 1 from file: 635)
0652405 96-09139
Physician-run network signs up payer groups
PUBL DATE: 951127
WORD COUNT: 864

9/6/63 (Item 1 from file: 636)
03748067 Supplier Number: 48105185 (USE FORMAT 7 FOR FULLTEXT)
BAY NETWORKS: GE Capital IT solutions named Bay Networks enterprise solutions partner
Nov 5, 1997
Word Count: 825

9/6/64 (Item 1 from file: 790)

00420539
CLOTURE MOTION OPENS THE DOOR FOR VOTE ON ENERGY BILL.
DATE : 19921008 (October 08, 1992)
DOCUMENT TYPE:
CONTENT UNIFIER: Congressional Record
CONTENT SPECIFIER: 19921008
AVAILABILITY: Full Text length is 13314 lines

9/6/65 (Item 2 from file: 790)

00402823
TEXT AVAILABLE OF R&D CONSORTIUM PRESIDENT'S TESTIMONY AT WAYS AND MEANS HEARING.

DATE : 19920129 (January 29, 1992)
DOCUMENT TYPE:
CONTENT UNIFIER: Testimony Other Than IRS and Treasury
CONTENT SPECIFIER: 19920129
AVAILABILITY: Full Text length is 507 lines
?t s9/9/20

9/9/20 (Item 14 from file: 15)
DIALOG(R)File 15:ABI/INFORM(R)

01070889 97-20283
The impact of explanation facilities on user acceptance of expert systems advice
Ye, L Richard; Johnson, Paul E
MIS Quarterly v19n2 PP: 157-172 Jun 1995 CODEN: MISQDP ISSN: 0276-7783
JRNL CODE: MIS
DOC TYPE: Journal article LANGUAGE: English LENGTH: 16 Pages
SPECIAL FEATURE: Charts References
WORD COUNT: 8879

ABSTRACT: Providing explanations for recommended actions is deemed one of the most important capabilities of expert systems (ES). There is little empirical evidence, however, that explanation facilities indeed influence user confidence in, and acceptance of, ES-based decisions and recommendations. The impact of ES explanations on changes in user beliefs toward ES-generated conclusions was investigated. Grounded in a theoretical model of argument, 3 alternative types of ES explanations - trace, justification, and strategy - were provided in a simulated diagnostic expert system performing auditing tasks. Twenty practicing auditors evaluated the outputs of the system in a laboratory setting. The results indicate that explanation facilities can make ES-generated advice more acceptable to users and that justification is the most effective type of explanation to bring about changes in user attitudes toward the system. These findings are expected to be generalizable to application domains that exhibit similar characteristics to those of auditing.

TEXT: Introduction

Expert systems (ES) are computer programs capable of performing specialized tasks based on an understanding of how human experts perform the same tasks. Few ESs, however, are targeted at replacing their human counterparts; usually they are intended to function as assistants or advisers to professional people with different technical background and problem-solving experience (Berry and Hart, 1990; Feigenbaum, et al., 1988; Leonard-Barton and Sviokla, 1988). To be useful and acceptable, it has been argued, an ES must not only perform at a level comparable to a human expert's, but also must be able to explain, in a form understandable to users, the reasoning processes it employs to solve problems and make recommendations (Duda and Shortliffe, 1983; Moore and Swartout, 1988; Teach and Shortliffe, 1981).

Central to the issue of explanation are two unique characteristics of ES applications. First, ESs are often developed to help make relatively unstructured decisions, and a time lag may exist between when such decisions must be made and when their quality can be assessed. As a result, the acceptance of ES-generated advice is more likely to be determined by its reasonableness than by its correctness. Second, real-world decisions

have practical--financial, legal, political, and social--consequences. If users are to remain responsible for the decisions made, they are unlikely to accept a system's recommendation if they do not understand its underlying reasoning processes (Hollnagel, 1987). An explanation facility provides the potential to make an ES more useful and acceptable by increasing user understanding of, and confidence in, its decisions and recommendations.(1)

Past research in ES explanations has focused on establishing "existence proofs," i.e., solving the theoretical and practical problems of explanation generation (cf. AAAI, 1990; AAAI, 1992; Moore and Swartout, 1988). Given the potentially high costs of making these explanations available, as exemplified by the difficulties earlier research has encountered, there appears to be little guarantee that automated explanations will produce the positive impact on the uses of ESs as expected. Indeed, there have been documented cases in which users question the utility of having an explanation facility (Slatter, et al., 1988) or ignore the explanation facilities altogether (Hart and Wyatt, 1990).
In this light, our paper reports an empirical investigation of the value of ES explanations to users. Specifically, a laboratory setting was employed to study the impact of alternative types of explanations on user acceptance of ES-generated advice. The scope of the study was limited to diagnostic problem-solving, a process in which a system's true states are inferred from observable but noisy data called symptoms. At the conceptual level, diagnosis represents an important class of problems across a variety of domains, and it was among the earliest candidates for ES applications (Clancey, 1985; Davis, 1993; Stefik, et al., 1982; Torasso and Console, 1989).

The next section provides the conceptual basis for the study and develops the research hypotheses. The following section employs a detailed discussion of the research method employed. The balance of the paper presents the results and discusses the findings.

Conceptual Basis of Research

According to the American Heritage Dictionary, to explain is "1. to make plain or comprehensible; 2. to define, expound; and 3. to offer reasons for or a cause of, to justify." Within the context of using expert systems to solve problems, the term "explanation" has been used very loosely to cover almost any request for further information. For example, users might have a need for further operational instruction, more data, explication of terms, feedback, or justification of the reasoning methods used or advice given. Clearly, in each case both the form and the content of the information needed could be different, and grouping them all together under the same term, "explanation," would not be helpful.

This study adopts a typology of ES explanations that has been the focus of prior research. Together, three types of ES explanations are identified (Chandrasekaran, et al., 1988; Clancey, 1983; 1993; Neches, et al., 1985; Swartout, 1983; Wick, 1992):(2)

1. Trace, or Line of Reasoning, which refers to a record of the inferential steps taken by an ES to reach a conclusion.

2. Justification, which is an explicit description of the causal argument or rationale behind each inferential step taken by the ES.

3. Strategy, which is a high-level goal structure that determines how the ES uses its domain knowledge to accomplish a task.(3)

The next section introduces a conceptual model developed by Toulmin (1958) for the process of argumentation. This model is then applied to the three types of explanations to form the theoretical basis for our research.

Toulmin's model of argument

Stephen Toulmin (1958) formalizes a model of argument to reflect the "rational process" (p. 7) characteristic of human reasoning. Drawing an analogy from claims and argument made in the courts, Toulmin proposes the structure and procedures by which "claims-in-general" can be argued for and accepted.

Toulmin makes a clear distinction between the "field-invariant" and "field-dependent" aspects of argument (p.15). Regardless of the context that surrounds the argument, its field-invariant aspect consists of six elements (also see Ehninger and Brockriede, 1960; 1978; Toulmin, et al., 1984):

1. Claims (C)--assertions or conclusions put forward for general acceptance. A claim is always of a potentially controversial nature.

2. Data (D)--statements specifying the particular facts or previously established beliefs about a situation based on which a claim is made.
3. Warrants (W)--statements that justify (or certify) the reasonableness of leaping from data to a claim.

4. Backing (B)--the general body of information or experience that assures the trustworthiness of a warrant. Backing is not needed unless the validity of the warrant is challenged.

5. Qualifiers (Q)--phrases expressing the degree of certainty placed on a claim. No qualifier is needed if a claim is considered indisputable.

6. Possible Rebuttals (R)--extraordinary or exceptional circumstances that might defeat the warranted claim. The function of a rebuttal is analogous to a safety valve and therefore is optional.

Argument is typically made in such a manner that the following relationships among the six elements exist (Ehninger and Brockriede, 1960, p. 45):

(Diagram omitted)

Despite this basic, context-free structure said to be at work in any argument, according to Toulmin (1958), an analytical framework of argument is not complete unless it includes the larger human enterprise whose purposes argument serves; hence the field-dependent aspect of argument. For example, in different domains, there are differences in the degree of formality and precision that argument must satisfy in order to be acceptable. The fundamental force of medical argument is realized only to the extent that the enterprise of medicine itself is understood, and the same is true in business, politics, law, or any other fields.

Explanation as argumentation

Toulmin's model of argument is significant in the way it highlights the discrete response steps that an ES explanation facility should follow in order to answer user queries in a convincing way. Increasingly, researchers of ES explanation facilities have drawn upon studies in argumentative dialogues to generate explanation dialogues (e.g., Cavalli-Sforza and Moore, 1992; Moore and Swartout, 1989; Quillici, 1991). The relevance of the model to each type of explanation is discussed next, with examples drawn from the domain of auditing.

Trace

The opportunity of using trace as a source of explanation first appeared with the introduction of rule-based ES (Buchanan and Shortliffe, 1984). A rule is a representation of a data-conclusion association, where a conclusion can be inferred from a logical combination of some premises. Moreover, certainty factors (CF) can be added to a rule to indicate how strongly the premises have been confirmed or how probable the conclusion can be inferred from the premises. Because the conclusion clause of one rule can be used to confirm the premises of another rule, a collection of rules used together become a network of individual inference steps. A trace is a record of the system's run-time, rule-invocation history. Properly presented, a trace allows interactive question-answering about the system's reasoning steps: "How a request for data is related to a goal, how one goal leads to another, and how a goal is achieved (Clancey, 1983, p. 217)."(4)

A rule represented as a Premise-CF-Conclusion triad corresponds to a Data (D)-Qualifier (Q)-Claim (C) structure in Toulmin's model of argument. The other three elements of the model are missing, however: warrant, backing, and rebuttals. Trace, which provides a chain of rules invoked by an ES, is insufficient to explain the system's reasoning processes, unless for each rule in the chain the user already understands exactly why the premises (D) necessarily, or conditionally if the CF (Q) is less than 100 percent, lead to the conclusion (C).

Justification

By encoding large chunks of knowledge as empirical associations, ESs are constructed for efficient problem solving at the expense of omitting the intermediate reasoning steps on which these associations are based. Consequently, such systems lack the support knowledge necessary for justifying to the user why, for example, a conclusion follows naturally from its premises. To illustrate, consider the following excerpt from the verbal protocol generated by an auditor while performing an audit task:

The cash overdraft always raises red flags. It's one of the items that we always look at. Or maybe I shouldn't say that it always raises a warning flag, but when people get into a cash overdraft situation then there should be current reasons for it. Otherwise you should be aware that they're having liquidity problems.

Viewed as argument, the auditor's line of reasoning corresponds to the following Toulmin structure.

(Structure diagram omitted)

Because the auditor does have some reservations about the conclusion, a qualifier (Q) and a rebuttal (R) are included to serve as an escape clause. On the one hand, it would be rather straightforward to encode this chunk of knowledge into a rule that, if reproduced by an ES to answer questions,

becomes part of a trace. On the other hand, the reason that a cash overdraft should signal a liquidity problem in the first place is less than obvious. To interested observers, the problem-solver's "inferential leap" from the data to the claim needs to be justified.

Probed further, the auditor may offer new information to support his/her claim by adding a warrant (W) and perhaps even a backing (B). The first diagram on the next page completes an example of Toulmin's model of argument at work.

There are two practical reasons that justification, which requires a deeper understanding of the domain, can be important. First, by demonstrating that the conclusions developed by the system are based on sound reasoning, justification helps increase ES users' confidence in the system's problem-solving competence and hence, the acceptability of the conclusions. Second, because ESs can only achieve high performance within relatively narrow problem areas, justification enables users to make more informed decisions on whether the system's advice should be followed. For example, in boundary cases or unusual situations, the lack of specific knowledge may cause an ES to respond to a problem inappropriately, and justification forces it to reveal such limitations.

(Diagram omitted)

Both the warrant and the backing of argument serve the function of justification, but at different stages. If the warrant is challenged, the backing becomes the next line of defense, opening a new round of argument. The process does not end until either the warrant is accepted, or no further backing can be offered.(5) Toulmin's framework shows where justification for a line of reasoning should be focused. Examined within the present context, it also points out the type of information a knowledge engineer needs to extract from a problem solver, if the knowledge obtained is to be used later for explanation purposes.

Strategy

Instead of asking what knowledge is being applied by an ES (trace) and its underlying rationale (justification), users may be interested in knowing why information is gathered in a certain order, why one particular chunk of knowledge is invoked before others, and how individual reasoning steps contribute to a high-level objective. To answer these questions, the system must have access to knowledge about its problem-solving strategy. Moreover, because strategic knowledge often involves general principles in problem solving, it also finds use in knowledge-based tutoring systems that teach, among other things, high-level reasoning and problem-solving skills within specific domains (e.g., Clancey, 1986; Nickerson, et al., 1985; Regian and Shute, 1992).

Structurally, explaining the system's strategy is similar to providing justification in the sense that the system must clarify why it solves a problem by following a specific procedure (Clancey, 1993). The Toulmin diagram below provides such an example (qualifiers and rebuttals omitted).

(Diagram omitted)

Cost of automated explanations

ES explanation facilities that provide users with access to justification

or strategic knowledge are more difficult and more costly to develop than those relying primarily on a trace of the system's execution paths. The raw materials from which a trace is constructed are part of the system's knowledge base, and providing a trace as explanation is largely a problem of presentation. Rules, for example, are often encoded internally in a succinct way for efficient storage and execution, and making them comprehensible to a user typically involves simple translation using a standardized natural-language template (Barr, et al., 1989).

On the other hand, because strategic knowledge tends to be buried implicitly in the knowledge base, and an ES does not need a representation of justification knowledge in order to execute, neither type of information is readily available for explanation purposes. Not only must additional efforts be spent uncovering the knowledge to be used for explanation, but more fundamental issues may arise concerning the psychological validity of the explanation knowledge so acquired.

It is common practice, for example, to study decision making by a variety of process tracing techniques, i.e., observing the human expert performing a task and then analyzing a record of the entire problem-solving process (Todd and Benbasat, 1987). It is considered rather disruptive, however, to ask the expert for an explanation of his/her reasoning while the decision-making process is under way (Ericsson and Simon, 1984; Nisbett and Wilson, 1977). An alternative is to ask the expert to provide a retrospective rationalization of the decisions made, but there is evidence that people are not always conscious of their belief structures and therefore have marked difficulties in providing post hoc justification that is consistent with the quality of their performance or with their problem-solving behavior (Berry and Broadbent, 1984; Norman, 1983; Wason and Evans, 1975).

Contrary to common beliefs, a truly informative explanation facility does not come free with the acquisition of some associative knowledge and the encoding of that knowledge in a computer program for problem solving. The resolution of many non-trivial theoretical and practical difficulties in automated explanations demands a significant amount of research and development resources. It is important that we establish the relative merits and usefulness of this technology, lest we run the risk that the resources devoted to constructing "existence proofs" might not be justified.

Development of hypotheses

The purpose of this study is to examine the impact of ES explanations on users' acceptance of ES-developed conclusions and to identify the type of explanation that is most effective in producing such an impact.

Unlike conventional information systems that function in relatively structured task environments, the nature of ES applications suggests that the conclusions and recommendations developed by an ES can be potentially controversial. To reduce the amount of uncertainty associated with ES-based decisions and increase the system's acceptability to users, an explanation facility is necessary.

ES explanations serve the function of argument. Because the primary purpose of argument is to advance a problematic claim and have it accepted, for the argument to be considered successful, there must be a change from an existing belief to the adoption of a new belief on the part of the audience

(Achinstein, 1983; Dretske, 1988; Ehninger and Brockriede, 1978; Toulmin, et al., 1984). The change is unlikely to take place, however, unless the audience agrees with the evidence (data) and endorses the principle that is expressed or implicit in a warrant (Ehninger and Brockriede, 1978). It follows that, by making available the data an ES uses to reach conclusions and the rationale that justifies such inferential leaps, an explanation facility has the potential to affect users' beliefs in the system's conclusions. This expectation leads to the following hypothesis:

H1: ES explanations can affect users' beliefs in the system's conclusions.

Of the three types of explanations discussed above, justification appears to have the highest potential to change user beliefs in an ES-generated conclusion. Strategy, while explaining why things are done in a certain order, provides information at the wrong level. The fact that there is a separate body of "domain-general" knowledge (Clancey, 1993, p. 199), which governs the use of domain-specific knowledge, suggests that ES conclusions must be expressed at a level consistent with the advice the user is seeking (i.e., as shown in the earlier example, an ES for financial statements analysis will advise that the client might have liquidity problems, while timing the analysis of inventory market value might be an internal task of that system; an ES for audit planning, on the other hand, will most likely offer the timing of specific task performance as advice to the user). If strategy does not provide information at the system's conclusion level, it is unlikely to impact users' beliefs in these conclusions.

Judged from the perspective of argument, if the system's conclusion is indeed controversial, additional information provided by trace, i.e., data used to reach the conclusion, may be insufficient to bring about changes in users' beliefs. By definition, data are pre-established facts or beliefs. Data alone are unlikely to provide much added value, unless (1) the user is unaware of the existence of such data, and (2) the user will interpret the data in the same way and reach the same conclusion as the system does.

If the user does not understand the underlying rationale of an inferential leap that the system is making (hence the controversy), only justification provides the right type of information that can help bridge the gap. Providing justification for the system's conclusions may or may not completely resolve the controversy, but making it available at least presents the opportunity to allow the system's side of the story to be understood (Toulmin, et al., 1984). If users find justification most useful in helping them judge the acceptability of the system's conclusions, it is expected that they will use this type of explanation more often and will spend more time examining it. These expectations lead to the following hypothesis:

H2: The most effective type of explanation in helping to change users' beliefs is justification.

a. Users will request justification more frequently than they will other types of explanations.

b. Users will spend more time examining justification than they will with other types of explanations.

Research Method

This research was conducted in a laboratory setting using a simulated ES. This section describes the domain, research design, development of the

stimulus material and the system, dependent measures, participants, and experimental procedures.

Domain

The domain of auditing was chosen for the study of ES explanations. First, auditing is diagnostic in nature, since the overall objective of auditing is to detect discrepancies between the financial statements of an enterprise and its true financial health. Second, audit decisions are often judgmental and notably consequential; the validity of many audit decisions is either impossible to evaluate in a short term, or is too costly to verify. As a result, auditors must be prepared to defend, before their clients and their colleagues, every conclusion they make (Ashton, et al., 1989).

Design

In this study, participants evaluated the outputs of an ES performing an analytical review, a procedure widely employed by auditors to collect evidence (Blocker and Willingham, 1985). Because of the lack of access to a real ES for analytical review, a computer program was developed to simulate the user interface of such a system. As a tool frequently employed in the study of human-computer interaction (e.g., Good, et al., 1984; Gould, et al., 1983), simulation allows various design alternatives to be explored in a realistic research environment. At the same time it avoids the use of such technologies as natural language processing and text generation, which are yet to become widely available.

A one-group pretest-post-test design was employed in this study. Explanation was the independent variable: the overall presence or absence of explanation was manipulated, and the participants' belief in the system's conclusions before and after they received explanation were measured. There are potential confounding effects associated with a one-group design, specifically the history effect and the maturation effect (Emory, 1991). In this study, however, the duration between the pretest and the post-test was considered too short to cause these effects.

Material

The stimulus material for the experiment consisted of an audit case and the outputs of the simulated ES (the system). Originally designed for the study of auditing expertise (see Johnson, et al., 1989; 1991), the case involved a publicly traded medical products company in which a series of frauds were perpetrated by senior management. Adapted for our study, the case material included a narrative description of the business and a set of financial statements and associated notes. Having been tested and improved over time, the case appeared to reproduce the complexity and the challenge of the participants' usual task environment.

The outputs of the system included (1) a series of audit conclusions related to various parts of the financial statements, and (2) three alternative explanations for each conclusion. Two domain consultants assisted with the development of these outputs. First, using data collected from prior research, a series of conclusions were developed. Next, using Toulmin's model of argument, templates were developed to constrain the syntactic structure that each explanation type would conform to and to define the nature of its information content. Three explanation texts (trace, justification, and strategy) were then developed for each

conclusion based on input from one of the consultants. To ensure a high quality of explanation material, the initial set of explanations so constructed was presented to the second consultant for critique, and a revised version was shown to the first consultant. This process was repeated until all major disagreements were resolved.
To ensure the three explanations pertaining to the same conclusion could be considered equivalent in terms of their readability, the explanation material was further calibrated. First, the material was rated for subjective readability by 15 MBA students completing a course in auditing. Their ratings were used to make readability improvement to the material. The explanation texts were then empirically calibrated by 32 upper-division business students completing an auditing course. Reading rate and recall accuracy were employed as indirect measures of readability (Kintsch and Vipond, 1979). For each conclusion developed, if its explanations were found to have statistically significant differences in readability, both the conclusion and the explanations would be excluded from the material. The final version of the material included 14 conclusions and their corresponding explanations.

System

A typical user-ES dialogue may include the system's requests for data, the user's data entry as requested, the system's presentation of conclusions and recommendations, and the user's requests for explanations pertaining to any specific data request or conclusion. Because of the large quantity of data required by an auditor for the analytical review task, interactive data entries were deemed too time-consuming to be part of the experiment. It was assumed, therefore, that the data entry routine would be completed in advance and that the system would not ask the participants for interactive data inputs.(6)

The resulting dialogue included the following system outputs: (a) a client company profile at the beginning of the review, (b) a series of audit conclusions related to various parts of the financial statements, (c) three types of explanation for each conclusion, and (d) a review summary to highlight the system's recommendations. Prior studies (Johnson, et al., 1989; 1991) indicate that a typical strategy used by auditors on analytical review tasks is to first develop a model of the client company, and then identify potential audit risks associated with such a model. Because auditors following the strategy tend to examine client financial statements in their standard presentation sequence (i.e., a narrative followed by a balance sheet, an income statement, a statement of changes in financial position, etc.), the dialogue presented various conclusions in the same order to reflect the use of that strategy.

To make the system look "real," intentional delays were embedded in the user-system dialogue, especially prior to the presentation of each conclusion. This would create the impression that the system needed time to develop the output. The amount of keyboard inputs required on the part of participants was minimal. In addition, an online help facility was available in anticipation of potential operational difficulties. Finally, there was a built-in routine that would capture all user keystrokes and elapsed time (in 1/100 seconds) between these keystrokes. The system went through several rounds of pilot tests with academic and practicing auditors. The results of these tests indicated that the system would appear realistic to participants.

Dependent measures

Change in belief was the primary dependent variable. For each conclusion produced by the system, participants were asked to indicate, on a seven-point scale, the extent to which they believed that the conclusion was true or reasonable, before and after they received explanations offered by the system. The before-explanation score measures participants' existing belief in the system's conclusion, and the after-explanation score measures their newly adopted belief. The difference between these two scores was used to measure whether explanations had any impact on participants' belief in, and hence their acceptance of, the system's conclusion (Cohen, 1989; Dretske, 1988).

Two other dependent variables--choice of explanation and elapsed reading time--were used to measure the degree to which participants actually found uses for individual types of explanations. Choice of explanation was recorded as the frequency of requests participants made for each explanation type. Elapsed reading time was measured by recording elapsed time between keystrokes and calculating the average time participants spent examining individual explanations (in seconds per 100 words of text). These usage measures provide a more direct indicator of the relative value of alternative explanation types to users.

Participants

Twenty practicing auditors from a large public accounting firm participated as subjects. They ranged from staff-level accountants with two years of practice to audit managers with six or more years of practice in the public accounting profession. While it was not practical to employ randomization procedures in selecting the participants, participation was voluntary, and there was no obvious reason to believe that the sample selected was systematically biased in any respect.

Procedures

A two-hour experiment was administered individually to participants in a microcomputer laboratory. All instructions were provided in written form. The experiment was divided into two sessions: a review session followed by an evaluation session. During the review session, participants were asked to assume the role of a manager on an audit team. Their task was to conduct an analytical review on a set of draft financial statements of a client company (the audit case) and to provide a written summary identifying any unusual account relationships that might lead to further investigation. The purpose was to engage participants in active problem-solving and to allow them to become familiar with the case material.

At the beginning of the evaluation session, participants were presented with a different context: they were asked by their firm to evaluate a computer-based decision aid for analytical review. Their task was to provide critiques on the conclusions and explanations developed by the system and to make a recommendation as to whether their firm should consider adopting such a system. Throughout the experiment, participants were unaware that the system they evaluated was a simulation.

The first half of the evaluation session served a training purpose. The system presented eight conclusions. Participants practiced reviewing each conclusion and the corresponding three types of explanations. During the second half, the system presented six conclusions. For each conclusion presented by the system, participants were first asked to indicate to what

extent they believed that the conclusion was true or reasonable. They were then allowed to either proceed to the next conclusion, or freely request and review any of the three types of explanations. If participants requested at least one explanation, before they proceeded to the next conclusion, they were asked again to indicate to what extent they now believed the system's present conclusion was being true or reasonable. Throughout the evaluation session, participants were also invited to provide, in writing, free-form comments about the system's outputs.

Results

Change in belief

Change in belief was the difference between participants' post-explanation belief and pre-explanation belief scores. Prompted with the statement, "I believe the system's conclusion is true or reasonable," prior to and after receiving explanations, participants provided ratings on identical seven-point scales, ranging from "1" for "strongly disagree" to "7" for "strongly agree." Table 1 presents the summary statistics on these measures and the results of a paired T-test performed on change in belief.(All tables omitted) There was a significant increase in participants' belief in the system's conclusions, after they reviewed explanations provided by the system. The result thus provided support for H1.

Choice of explanation

Table 2 shows the number of times a request was made for each type of explanation, as well as its share (in percentage) of the total number of requests made. The results indicate that justification was the most frequently requested explanation type, followed by trace. Strategy was the least frequently requested explanation type. Also shown in Table 2, a one-dimensional chi sup 2 test found significant differences among the total number of requests made for each type of explanation. This result provided support for H2.a.

Elapsed reading time

Table 3 presents the average elapsed time participants spent examining each type of explanation (adjusted for the amount of text read), as well as the results of a repeated-measures ANOVA test. Participants spent relatively little time reading strategy, substantially more time examining trace, and the greatest amount of time inspecting justification. The ANOVA test found significant differences among the three average reading times. The result provided support for H2.b.

Discussion

This section discusses the findings and the limitations of the study, and the implications of the results for research and practice.

Interpretations of findings

The results of this study are consistent with the view that explanations can have a positive impact on user acceptance of an expert system. After they had the opportunity to learn about the system's reasoning processes through the explanations, participants appeared more convinced about the soundness of the system's conclusions, as demonstrated by their increased belief in those conclusions. Indeed, 17 (85 percent) of the 20

participants' overall impression of the system was so positive that their final recommendations of the evaluation were all in favor of adopting the system.(7)

More specifically, the study found justification to be the most effective type of explanation in making the system's conclusions more acceptable, as evidenced both by the highest frequency at which justification was requested, and by the unproportionately large amount of time participants spent analyzing it. Participants' informal comments also provided support for their discrete usage patterns, as a number of them suggested that they would always want to see the justification for a conclusion, and they wondered why conclusion and justification were not presented together. These findings are consistent with Toulmin's prediction in his model of argument that a potentially controversial claim cannot be supported by data alone, and that a warrant will be necessary in order for the claim to be considered acceptable (Toulmin, 1958; Toulmin, et al., 1984).(8)

In addition to providing support for the research hypothesis concerning the usefulness of justification, the results indicate other usage patterns. Participants also made a relatively high number of requests for explanations based on trace, which provided information on the specific data items the system used to reach conclusions. Considering the fact that the system did not request user data inputs, participants' need for trace seems understandable. Although they were exposed to the case material during the review session, they might have either ignored some case data or failed to remember all the details. One question naturally results: would users still need trace if they were asked to provide all data inputs? In this case, users most likely would want to know why certain data items were being requested, and trace would instead provide information in terms of the conclusions the system would try to draw based on the data supplied (see an earlier discussion on page 4, and footnote 4, of this paper). In view of Toulmin's model of argument, trace is useful because it makes explicit both the data used and the claim inferred from the data, but it is insufficient to cause changes in users' beliefs.

Despite their role as critics of the system, participants did not appear to be concerned about the system's strategic knowledge. In particular, they spent a brief amount of time examining strategic explanation: they seemed disappointed with the information provided and lost interest quickly. In their written comments, participants suggested that one role of strategic explanations was to remind the auditors about the higher-level audit objectives to be accomplished (i.e., the "bigger picture" to be maintained) while analyzing a specific situation. This finding is consistent with the expectation discussed earlier--that information not directly supporting the system's conclusions will not affect users' beliefs. Beyond its role of providing an overall picture of the task at hand, participants also commented on the potential value of strategic explanations in auditor training. This observation again supports the view that strategic knowledge might be most useful in knowledge-based tutoring systems (Clancey, 1986; Nickerson, et al., 1985; Regian and Shute, 1992).

Finally, for exploratory purposes the impact of participants' domain experience on their need for explanations was also examined. The collected data were divided into two groups: data from auditors with two to four years of practice (novice group) and data from auditors with six or more years of practice (expert group). The data were then compared. The change in belief scores for the two groups was comparable, indicating they were equally likely to be influenced by explanations. Both groups also requested justification most frequently, followed by trace and strategy, in that

order. These informal results seem to suggest that level of domain experience is not a factor in assessing the impact of explanations on users nor in determining the most desirable explanation type.

On the other hand, the novice group did make a significantly higher number of requests for explanations than the expert group. Novices made a total of 133 requests (56 for justification, 46 for trace, and 31 for strategy), compared to experts' 94 requests (30 for justification, 34 for trace, and 21 for strategy). The difference came as no surprise, however: one would expect that more experienced auditors should be able to understand the system's conclusions better and therefore have a lesser need for additional information.

Limitations

The main limitations of the study center on the scope of the experiment, the limited user-system dialogs, and the experimental task used. First, the experiment focused on a single problem domain. The generalizability of the results would likely increase, for example, if two or three different domains were studied. The resource requirements, on the other hand, would be substantial in terms of developing and testing the stimulus materials for each domain, which would demand large amounts of domain consultants' time. An argument can be made, however, that ES applications in many other domains share the characteristics of those in auditing and therefore can benefit from the study's findings. For example, medical diagnosis, credit appraisal, insurance underwriting, and trouble-shooting complex mechanical or physical systems all involve the use of judgments. Decision making in these domains can be highly consequential, and the correctness or validity of these decisions is either impossible or too expensive to quickly verify (Torasso and Console, 1989).

Second, the user-system interface used in the experiment did not allow different problem context for explanation to be explored. For example, the lack of data entry requirements would not prompt potential user questions on why the system needed specific data (trace would have been used to answer such questions), and it was not possible for participants to volunteer information. While the user-system dialog of the study was designed to emphasize ease of operation and controlled data collection, the interpretation of the results must take these conscious design choices into consideration.

Third, in this experiment the participants' main task was to evaluate a decision aid, not to use it to aid in decision making. While studying such "first-time" user behavior is important because it helps assess the acceptability of an ES as judged from its explanation capability, it is nevertheless artificial. Caution must be exercised in deciding whether the findings could be generalized to experienced users, or to the real-world task environment in which users will truly be held responsible for any decisions they make or adopt.

Implications for future research

The efficacy of ES explanations is often intuitively assumed by the research community in explanation generation technologies, but not formally tested (except for a survey of potential ES users by Teach and Shortliffe, 1981). By providing empirical support for the claim that explanations can influence users' acceptance of ES outputs, the results of this study enhance the legitimacy of research in explanation development technologies. The results also suggest that better and more in-depth understanding of the

process of ES explanations is warranted. In addition, further investigation should be conducted on the domain characteristics that make ES explanations necessary and helpful. In our research, the nature of the auditing domain might explain a strong need for explanation facilities. Future research should focus on a more precise identification and definition of the factors in an ES task environment that dictate the usefulness of an explanation facility. For example, such a facility may be superfluous to users if the quality of the system's advice can be tested immediately, as might be the case in ESs developed for software debugging. After all, there appear to be many ESs in use now that offer at best very primitive explanation facilities. It is also possible, however, that ESs have not been more widely deployed in some domains because they are considered unacceptable without truly useful explanation capabilities.

This study found justification to be the most preferred explanation type. As a result, a different set of research questions relating to the effectiveness of justification can be introduced. Specifically, more in-depth inquiries on justification may benefit from earlier research in warrant, the key construct in Toulmin's model of argument. Rhetoricians, for instance, have studied warrants that are based on a rich variety of reasoning strategies, such as causal reasoning, classification, generalization (case-based reasoning), analogical reasoning, and the use of a combination of these strategies for different types of argument (e.g., Ehninger and Brockriede, 1960; 1978). Given the importance of justification to ES users, one future research direction may be to assess the impact of different kinds of justification and to identify the appropriate conditions under which each should be employed. For example, while justification based on causal reasoning--more likely referred to as scientific explanations (Achinstein, 1983; Mackie, 1980; Nettler, 1970)--might be most convincing, it will not always be available. In many domains, such as in stock market investment, the court of law, or career counseling, reasoning based on statistical evidence, past cases, or analogies may be a human problem-solver's best explanation strategy.

This study is an initial step toward formally examining the impact of ES explanation on users. A potentially more fruitful but also more challenging direction of research will be to study the impact of ES explanations in real work environments. More fundamental questions should be asked about the utility patterns of ES explanations in such settings, and about the impact of explanation facilities on users' decision-making behavior and performance. Obviously, these questions are of greater significance to ES developers and user organizations--questions that cannot be answered readily until they are studied in field settings and over an extended period of time.

Implications for practice

The practical problem addressed in this study was the following: can ES explanation facilities influence users' decisions on whether to adopt the advice of the system, and what kind of explanation is most effective in influencing users' decisions? From an ES developer's perspective, the study's findings suggest that explanations have the potential to make the system's conclusions more acceptable, if the underlying applications demonstrate characteristics similar to those of the auditing domain (see earlier argument under the Limitations section).

The results also suggest that developers of explanation facilities for an auditing ES might consider making justification available because it appears to be a more useful type of information in helping increase user

confidence in the system. Indeed, as suggested by several participants in their written comments, there is a question concerning the extent to which presentation of justification should be separated from the system's conclusions. Some believed that justification should be included by default as part of the system's conclusions, while others preferred to have control over what information to receive. In any case, the results further suggest that users should be given the flexibility to decide whether justification will be automatically presented with the advice being offered by the system, much as they have a choice with conventional interfaces capable of providing both menu- and command-driven dialogue structures, or both tabular and graphic presentation formats.

Developing an ES explanation facility with the capability to provide justification knowledge will be resource intensive. Many issues must be addressed, including the acquisition of valid domain knowledge, its internal representation, and automatic generation and presentation of comprehensible justification as explanations. Currently, a "canned text" approach remains the most efficient implementation technique (Wexelblat, 1989). The approach, similar to what was used in this study, offers predetermined natural language responses by anticipating possible user queries. Because the system has no control over the content of the explanation, however, this approach is likely to cause serious updating and maintenance problems over time. In the long run, newer theories such as the one that treats explanation generation as "reconstructive problem-solving" promise to provide much more flexible and maintainable explanation facilities (see Wick and Thompson, 1992).

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1 While the focus of this paper is the impact of explanations on ES users, an explanation facility has obvious value to ES developers. Validating and maintaining an evolving and expanding ES are non-trivial tasks, and an explanation facility can help developers recall the encoded problem-solving knowledge, identify faulty reasoning steps, and locate errors (Neches, et al., 1985).

2 While the user's need for explanations stems from the unique characteristics of ES applications, the ability to provide explanations is admittedly technology driven. The typology adopted in this study is strongly influenced by the rule-based tradition, one that remains the most popular and intuitive method of representing and reasoning about domain knowledge. Newer technologies, such as belief networks and neural networks, have been able to achieve expert-level performance without a cognitive model of the human expert. However, because the internal structures of these systems bear little resemblance to problem-solving expertise understood in human terms, it has been substantially more difficult to explain their reasoning processes to the user (Zehedi, 1993; but also see Suermondt, 1992 and Klein, 1994, for progress being made on explaining quantitative decision-making models).

3 Definitions, which include descriptions of terms and descriptions of differences between terms, are sometimes referred to as explanations (see Nettler, 1970 for a detailed discussion of explanation by definition). However, since a definition of something usually involves straightforward

information retrieval, not reasoning, the field has not considered it a major issue of explanation.

4 Many ES development tools use a trace facility to answer two types of questions: WHY and HOW. The WHY question is typically interpreted as "why did you (the system) request that data," and is answered by showing the conclusion of a rule that can be inferred from the data requested (the goal to achieve). The HOW question, on the other hand, typical means "how did you reach that conclusion," and is answered by showing all the data used to lead to the conclusion. These interpretations, however, do not account for all possible user intentions and are therefore inadequate as a method of classifying explanations. See, for example, Lehnert (1978), who proposes 13 types of questions for story understanding, including different kinds of why and how questions, and Graesser and Murachver (1985), who identify seven question functions and three statement categories to form a taxonomy of 21 question types.

5 As a result of this recurring relationship, Ehninger and Brockriede (1978) propose a simplified model known as a unit of proof, which includes every element of Toulmin's model except backing.

6 Commercial expert systems for financial planning applications typically use such an input strategy because of large quantities of client data.

7 The remaining three participants. all senior-level auditors. were more skeptical about the value of the system, mainly because they felt they could do better than what the system could.

8 Note that a warrant is still a necessary condition, but not a sufficient condition (see Mackie, 1980).

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GEOGRAPHIC NAMES: US

DESCRIPTORS: Expert systems; End users; Decision making; Acceptance; Auditing; Applications; Studies
CLASSIFICATION CODES: 9190 (CN=United States); 5240 (CN=Software & systems); 4130 (CN=Auditing); 9130 (CN=Experimental/Theoretical)
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SYSTEMS, MEDICAL DECISION SUPPORT SYSTEMS)
  Author:  SUERMONDT, HENRI JACQUES
  Degree:  PH.D.
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Reasoning under uncertainty forms a central task for most medical decision-support systems. The paradigm of Bayesian belief networks allows us to reason under uncertainty using probability theory, without forcing us to make unwarranted independence assumptions. The belief-network representation has led to a recent resurgence in the use of probability theory in decision-support systems.

Providing explanations of the conclusions of decision-support systems can be viewed as presenting inference results in a manner that enhances the user's insight into how these results were obtained. The ability to explain inferences has been demonstrated to be an important factor in making medical decision-support systems acceptable for clinical use. Although many researchers in artificial intelligence have explored the automatic generation of explanations for decision-support systems based on symbolic reasoning, research in automated explanation of probabilistic results has been limited.

In this dissertation, I defend the thesis that we can explain belief-network inference results by determining the influences of findings and of network structure on those results; that the explanations thus derived improve users' insight into probabilistic inferences; and that such enhanced insight can lead to improved decision making by medical practitioners.

This dissertation contributes a mathematical methodology that lets us determine the separate influences--on the belief-network inference result--of individual findings, sets of findings, belief-network arcs, and chains of reasoning. This methodology results in a set of functions that can be used to generate explanations. The methodology is general; it can be applied to any belief network. I call this explanation methodology--and its computer implementation--INSITE (Insight about Network Structure and Inference Through Explanation).

In an evaluation study of INSITE in the domain of anesthesia, I compared subjects who had access to a belief network with explanations of the inference results, to control subjects who used the same belief network without explanations. I show that, compared to control subjects, the explanation subjects demonstrated greater diagnostic accuracy, were more confident about their conclusions, were more critical of the belief network, and found the presentation of the inference results more clear.